WORK

An Illustrated Magazine of Practice and Theory

FOR ALL WORKMEN, PROFESSIONAL AND AMATEUR.

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A SUMMER-HOUSE OR GARDEN CAVE.

BY C. MAYNARD WALKER.

A SUMMER-HOUSE! "One of those sweet retreats which humane men erect for the accommodation of spiders," says Dickens. However true that may be, the writer in the following instructions will be unable to lay down any plan which will prevent these and other interesting insects from sharing the occupation with the owner. But Charles Dickens was not the first to discover this co-tenancy, for a very ancient philosopher, "good old Solomon," wrote thousands of years ago, "The spider layeth hold with her hands, and is in kings' palaces." However, these drawbacks notwithstanding, a summer-house of some sort is considered by most people a very desirable acquisition to a garden, more especially by London people, some of whose suburban edifices of this kind "are fearfully and wonderfully made," and present, when finished, admirable specimens of "patchwork;" and it is not until the intelligent observer has seen one of these that he has any idea to what extent a couple of empty egg-chests may be utilised in building operations.

The object of the writer in the present article is to give such instructions as will enable the reader to erect a substantial and commodious apartment, upon a novel plan, at a very moderate cost, even though he may never have tried his hand upon similar work before; in fact, I don't think any one can possibly go wrong in the matter, and for those who possess it, there is ample scope for the exercise of considerable artistic taste in the work, and moreover, the rough and perhaps clumsy work of a beginner is rather pleasing than otherwise in its effect, especially as Nature herself will give the finishing touches in due time. Fig. 2 effectively and graphically illustrates the appearance of a garden cave constructed upon this plan, and consists of a framework of galvanised iron wire netting laced to upright iron rods driven into the ground a few inches, and covered with rustic rockwork, formed with Portland cement and sand and ordinary rough gas coke, and is adapted to the requirements of a small garden. The dimensions, of course, may be varied indefinitely, but it is necessary that they should be decided upon before the work is commenced. Let us suppose that it is decided to have a rustic building, whose extreme height is 8 feet, constructed to stand alone (and let me say this kind of building should not be placed as a lean-to against a wooden wall or fence, or against any support which is not rigid), we shall require to set out a rough plan with pegs on the surface of the ground it is to occupy; I prefer to see an irregular polygon of, say, six sides of different widths.

In such case, it is necessary first of all to measure out the ground as in Fig. 3, regulating the width of the sides by the measurements of the galvanised wire netting, which you can obtain at any available shop; the wire netting should be of large mesh for obvious reasons, and it is moreover cheaper. Having settled this point, you will now

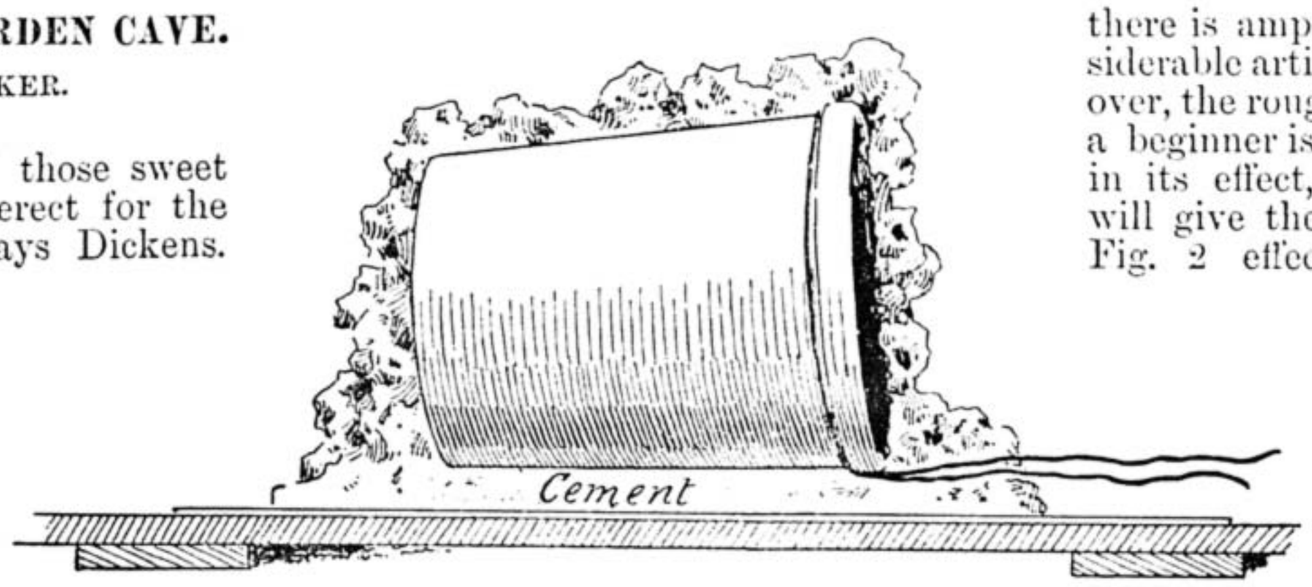

Fig. 1.—Section, showing Method of Making the Pot Pocket.

Fig. 2.—External View of Summer-house or Garden Cave.

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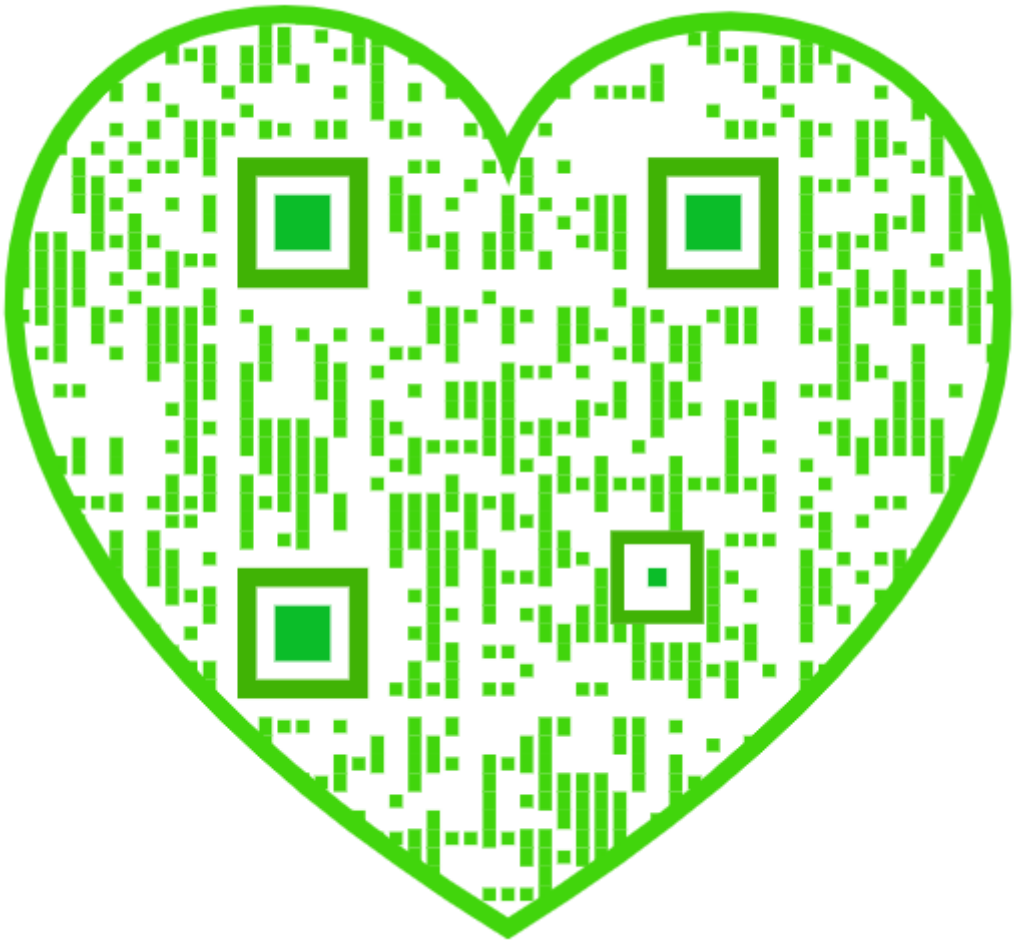

require to set up six lengths of ⅜-in. iron rod at the points indicated in Fig. 3. These should range from about 5 ft. 6 in. to 7 ft. 9 in., so as to produce an irregular appearance, and then a complete cage is to be formed over sides and roof with the galvanised wire netting laced to the iron rods with iron tying wire, the upper portion of these rods being carried crosswise to the highest point on the roof.

Take care that the whole of this caging is securely finished before attempting the next stage; the entrance or entrances must also be provided by cutting an irregular piece of wire netting out from one or more of the sides. Inlets for light here and there

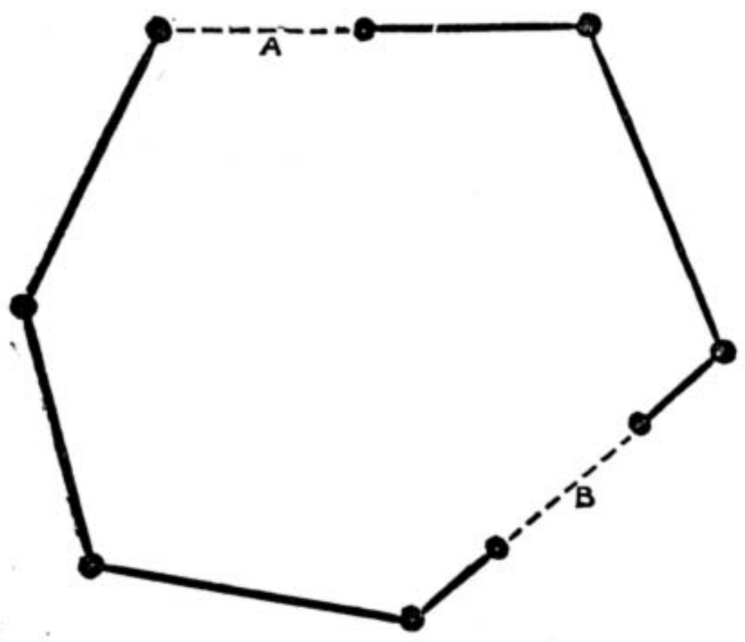

Fig. 3.—Plan and Position of Rods: A, B, Entrances.

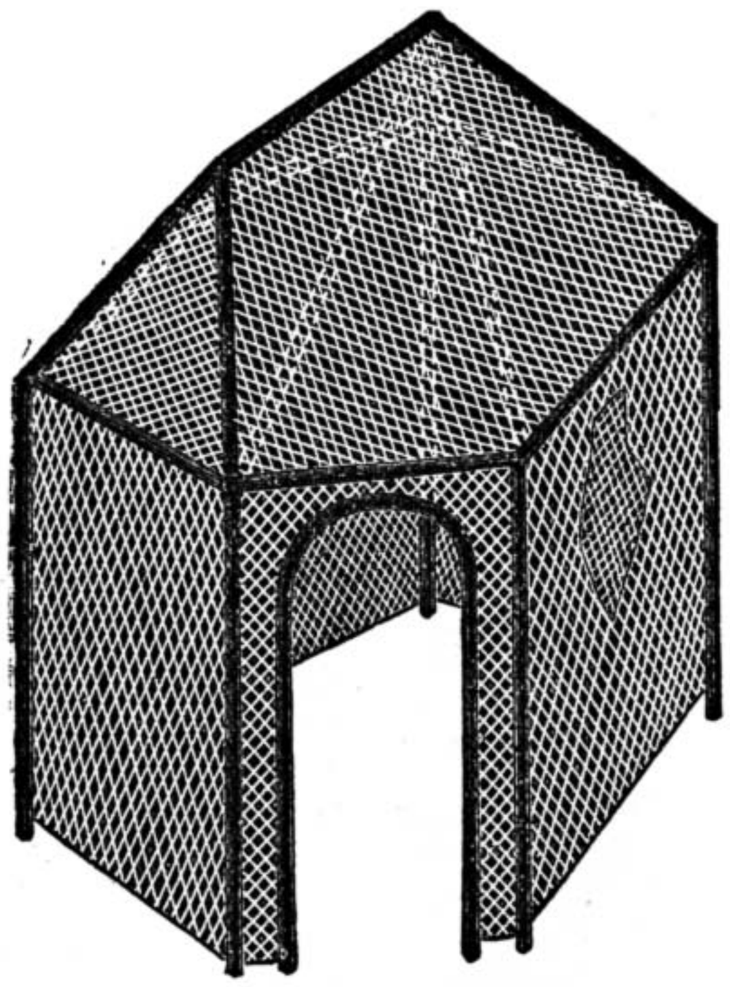

Fig. 4.—Iron Rods Laced with Netting on Irregular Hexagonal Figure.

may also be made in the same way. A charming effect may also be made in the finished cave by placing on the roof part at the highest points pieces of blue-tinted glass before making the rockwork. A most pleasing illustration of this effect may be seen in the Alhambra Court of the Crystal Palace, Sydenham.

With the view of making the summer-house or garden cave of still greater use, it will be well to provide it with a number of external pockets in which to grow ferns, flowers, or creepers; these should be made at this stage. Take a flower-pot, as in Fig. 1, and secure it round the rim with a piece of stout wire, leaving a convenient length of the latter; lay it on its side on a piece of board covered with paper, and having a layer of cement, and cover all over the surface of the pot pieces of coke well cemented together with Portland cement and sand. The coke for the whole of the work should be dipped in a thin batter of cement before use. Make as many of these pockets as are required, and put aside until quite set, when they can be secured to the wire netting by the wire, and left exposed for that purpose.

Having done this, the building up of the cave may be done. Having a good heap of cemented coke ready, and a bucket or slab of cement well mixed up with sand and water—about 1 part cement to 2 parts sand—one person should keep on mixing up the stuff well, while another cements the work. This should be done with a trowel. Take each piece of coke singly, and lay it so that a portion of it *goes into* the mesh of the netting, and see that each layer and every piece is well cemented, and as the work proceeds, every bit of the wire netting is hidden, and forms part of the rockwork, by going over it again from the inside; leave the roof part for a few days, and this will be much more substantially and neatly finished on the inside by temporarily fixing some boards under, and within about ½ in. of the wire netting. Cover this with paper, so that it will hold a layer of cement laid on from the top, then when the coke pieces are laid in this and through the meshes, set hard, and the temporary boards removed, you will have a neat, secure, smooth surface on the under part of the roof. The form of roof being angular also gives it greater strength when cemented up.

The work of preparation is by this time all but finished, and having cleared up all the inevitable mess, the worker will probably think that the colour looks rather raw. Nature will change all that in due course, but a temporary tinting of the projectives may be done *sparingly* by mixing some boiled oil and colour, and lightly touching up the surface with shades of brown and green. There remains now nothing but the seats to be provided for, which may well consist of planks fastened to uprights of wood staked into the ground. An irregular border bed all round the base of the summer-house, except the entrances, will add very much to the pleasing effect, stocked, of course, with suitable plants. I think that the worker, looking to the substantial and tasteful character of the erection, will agree with the writer that he has succeeded in building a commodious and useful house at a most moderate cost.

THE WATCH: HOW TO CLEAN AND REPAIR IT.

BY A PRACTICAL HAND.

In this, and in papers to follow, I propose to describe the various watches in general use, plainly and concisely, showing how to take to pieces, clean, and repair them—at least, the repairs which an intelligent amateur can do. I shall keep as much as possible from using the trade names of the parts, etc., so as not to mystify, seeing I am not writing for those already in the business, as they will receive full information and experience in their apprenticeship by those under whom they serve. My object is to make the watch a pleasant study, and, as a rule, all intelligent men or women look upon a watch with a degree of wonder and delight, as a thing of beauty to be admired. I, though thirty years in the trade, feel, when undertaking to put a watch (so dirty and out of repair) into order again, that it is next to restoring life. An amateur, then, after his first attempt upon some old timekeeper, may well feel a glow of pleasure on its commencing to tick once more, and by his own handiwork. Many attempt such work, but on account of not knowing how to proceed properly, take some part to pieces, forgetting the spring, which being in full force, as the watch may have stopped by dirt, the consequence is smash goes one or two pinions—cost, two dollars to replace, and never as good as the original ones. By following the instructions, no one with fair care need have any such mishap.

The Watch.—This word is derived from the Anglo-Saxon word signifying "to wake;" and in the sense of timekeeping first occurs in a record of 1542, which states: "Edward the VI. had onne larum, or watch, of *iron*, case being likewise of iron gilt, with two plummets of lead"—in other words, it was driven by weights. The invention of the watch originated at Nuremberg, 1417, so that watches were nicknamed Nuremberg eggs. Many curious designs were made, some in the form of a skull; the top part opened with a hinge, showing the dial, where the brains were located. Catherine I., Empress of Russia, had a musical watch, in the inside of which were the Holy Sepulchre and Roman Guards; by touching a spring the stones moved away from the door, angels appeared, and the holy woman stepped into the tomb and sang the Easter hymn of the Russian Church. In the Swiss Museum is a watch $\frac{3}{16}$ths of an inch in diameter, inserted in the top of a pencil case. Its tiny dial not only indicates hours, minutes, and seconds, but also the day of the month. The watch of Queen Elizabeth of England—a great curiosity—may be seen in the Mayers' collection of the Liverpool Free Museum; and all the old style of verges, etc., down to one of the smallest and handsomest Swiss productions. Also in the Guildhall, in London, various forms are shown—the old alarum watch, repeating ditto, and those having "catgut cord," from the spring barrel to the fusee, in place of our modern chain, to give impetus to the wheels. They are shown in order of date when in use; so are the old grandfather brass dial, carved cased clocks. To me, and thousands of others, they were a great source of interesting thought of bygone ages, picturing the care bestowed upon them by the wearers, who would a couple of hundred years ago pull them out of their deep fob-pockets and look with reverence as they denoted the time, in a manner that an apprentice would scorn nowadays. Like Captain Cuttle's watch in "Dombey and Son," that required to "be put back half an hour in the morning, and a quarter of an hour in the afternoon; then *Waller*, my boy, it will do you credit." Those old verges were well finished, and as they have such a good coat of plating upon the movements, at the present day many thousands of beautiful perforated cocks (or covers to the balance wheel) are worn as brooches, necklets, etc. etc. Then the silver used in their unwieldy cases was of the purest quality. I can well remember the old men who used those verge watches undoing the outer case, or cover, and placing it on their left thumb until the watch was wound up, with solemn gravity! At the beginning of the present century they were regarded as heirlooms, and handed down from father to son. "The big auld watch, yance my father's pride."

The last thirty years watches have become very common, even down to schoolboys; but the market is flooded with rubbish not

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SOME LESSONS FROM AN OLD BUREAU.

BY DAVID ADAMSON.

(*Continued from page* 279.)

WRITING FLAP OR LID: ITS CONSTRUCTION—HINGES—TREATMENT OF INSIDE OF LID—VENEERED BORDER—LOCK AND ESCUTCHEON FOR KEYHOLE—FITTING OF INTERIOR OF DESK—ORDER OF FITTING PARTS—MUNTINS FOR BACK—PANELS FOR BACK—FINISHING—HANDLES FOR DRAWERS—LINING—HOW TO PASTE IT TO WOOD.

THE writing flap or lid may next be attended to as being the next part of our work. It consists of four pieces forming a frame, and a panel fitting into it. The frame is mortised and tenoned at the corner, where it should also be mitred, as this looks better than if the shoulder were left square. As the combined mitre and tenon may not be understood by those not well up in carpentering, the mitred end, with the tenon, is shown in Fig. 19, first in perspective, then in plan and elevation. It will be as well that the tenons should be on the ends of the two long pieces of the frame, those which form the back and front of the lid. Grooves must be prepared all round the inner side of the frame, and a corresponding tongue round the panel, so that the whole may be closely fixed together firmly and neatly. I do not know whether it is necessary to say that the whole of the lid must be flush on both sides—*i.e.*, the panel should not be sunk below the framing. At the ends and front of the lid a rebate must be made, that when closed it may rest on the ends and top without having the clumsy appearance it would present if left to its original thickness. It will be noticed that the inner top is shown in Fig. 4 (page 116) slightly below start of slope in order to allow for this rebate, which may be about ½ in. in depth. The top piece of all is also shown bevelled for about half its thickness in continuation of the slope of the ends for the same reason, as the front or top of the lid when closed should not project above the top piece.

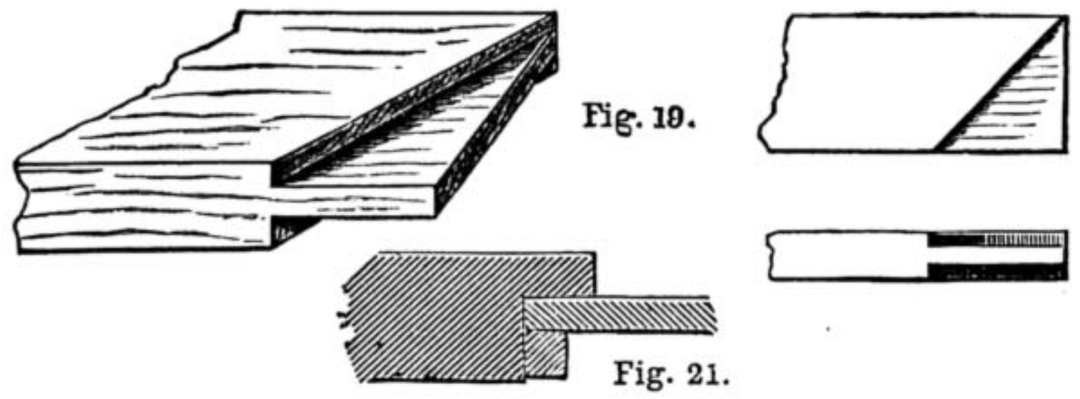

Fig. 19.

Fig. 21.

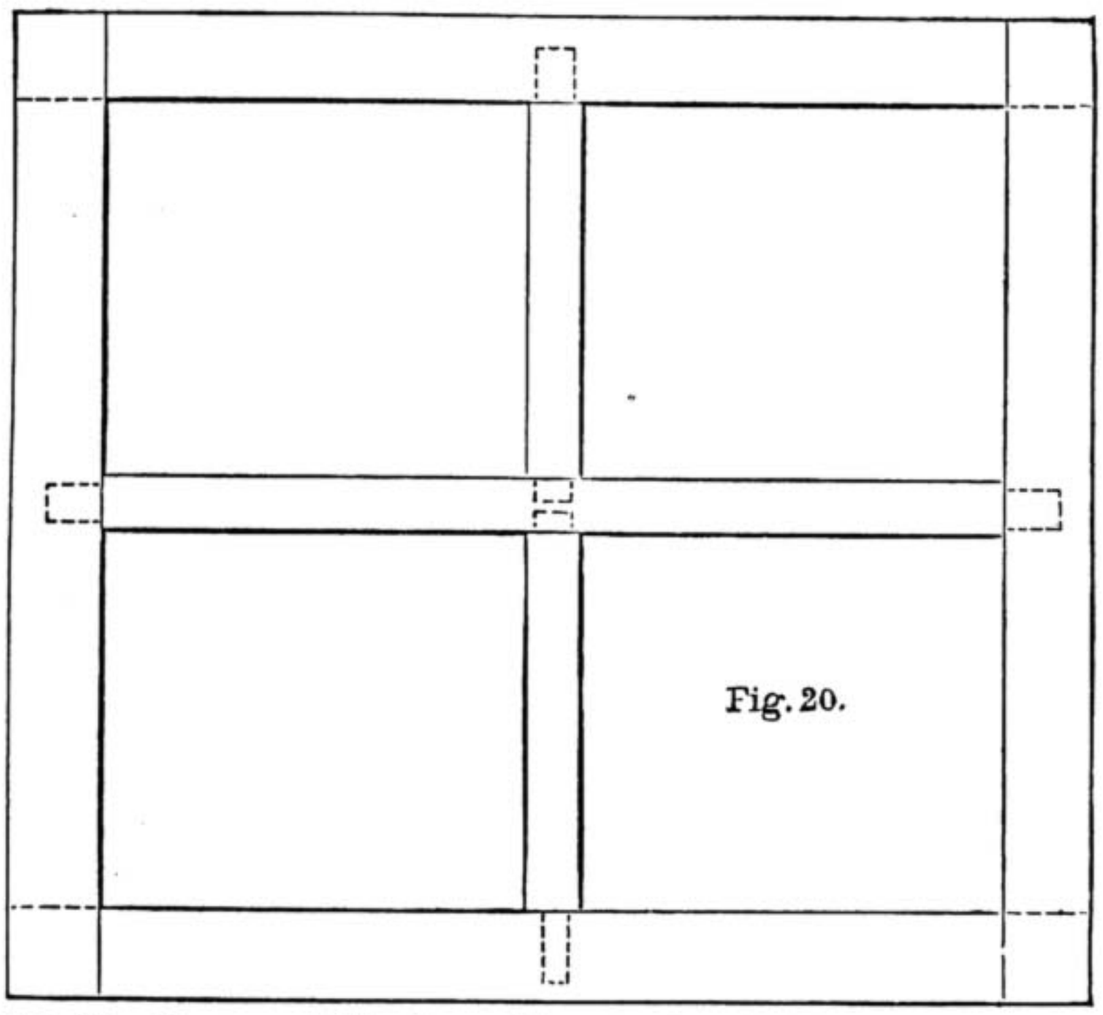

Fig. 20.

Fig. 19.—Tenon and Mortise. Fig. 20.—Panelled Back. Fig. 21.—Mode of Securing Panelled Back in Rebate.

The lid when finished in the wood is fastened to the bureau, with a couple of hinges sunk on the upper side of the lid and (inner) top. These hinges may be the sort specially made for desks, or the ordinary "back flaps" may be used. In either case they are fitted in the same manner, as they are to all intents and purposes the same in everything except proportion. The inside of the hinge must be uppermost to allow them to fold properly, and in case the projection of the knuckle above the table is objected to, the ordinary card table hinge, which, however, is hardly so suitable, may be used.

Next comes the treatment of the inside of the lid. This may either be polished or lined, preferably the latter, as the leather or cloth gives a pleasanter surface at which to write than the hard wood. The lining, however, must not be done yet, and it is only mentioned here as it is usual in tops so finished to have a veneered border. This border may be of any width, but should hardly exceed 2½ in., and it may very well be dispensed with altogether. Still for those who prefer having it, it may be stated that it can easily be laid with glue, the surplus of which should be thoroughly pressed out. The grain of the veneer should run in the same direction as that of the panel—viz., parallel with the length of the flap. The veneers should be damped on the upper surface before laying, otherwise the moisture from the glue will cause them to curl up. To lay such pieces the veneering hammer is generally used, but a good substitute may be found in a piece of wood applied to them with pressure, and worked along to squeeze out any excess of glue. Should this and any air bubbles not be properly pressed out, blisters will be formed. These, if suspected after the veneer is laid and dry, may easily be detected by tapping, or if they are very bad by merely passing the palm of the hand over the surface. The best way to lay them is to prick a small hole in the veneer, and then to press it down with an ordinary flat iron or a hammer head heated sufficiently to soften the glue, but not to burn it or the veneer. On the whole, however, it is hardly well for the amateur without competent guidance and practical demonstration to attempt veneering.

A lock should be fastened to the flap, but if not considered necessary a spring catch will do instead, though if it is not desired to lock up the desk part, it is hardly worth while taking the trouble to attach any fastening, as the weight of the lid is sufficient to keep it closed. Any way, instructions for making the bureau could hardly be considered complete without mention of the lock. This should be let into the flap level with its surface, and for the sake of symmetry the keyhole should be equidistant between the two ends. I am not aware whether a special lock was made for this purpose when bureaus were more common than now, but I believe there is not now. The difference between them—if there ever were such things—and the ordinary drawer or till lock could be but trifling, so that a drawer lock will answer every purpose. A space for the bolt must be cut in the top, and this should be done very neatly, for it will be found that the wood remaining above the hole is very thin indeed, so thin that a very slight pull would tear it away altogether. The probability of such a mishap occurring appears to have been foreseen by old cabinet makers, and provided against by letting a slip of brass in along the edge of the top just by the bolt hole. The strip extends a short way on each side of it, and is fastened down with screws. The keyhole should be provided with an escutcheon plate to match the drawers. The fitting of the interior of the desk next claims attention. The fitting of the whole of these pieces is exactly alike, and it will be an economy of time and labour to mark the various distances where a partition is to be placed before commencing to cut the grooves across. For example, take the piece No. 17 (page 115), which is to form bottom of pigeon holes and top of the centre three drawers. Mark out on its upper surface the distances of the pigeon-hole partitions, and with the square draw lines right across. Now, on these lines cut grooves from the back to within a little, say, ½ in. of the front. These grooves should be just wide enough for the partitions to enter them, and they should not be more, at the outside, than half the thickness of the wood in depth. The half inch left in the front should be cut into a V-shaped groove, and the bottom of the partition for the same distance back cut to fit it. For such small work a mitre block would be rather an encumbrance than a help to most workers, but judgment in cutting will be required. It will not be necessary to mitre the pieces fitting into the ends and top, that is to say, the divisions between the drawers and the upright partitions will require only grooves.

The various parts may, perhaps, best be fitted together in the following order:—1st, the bottom piece of all, No. 16; 2nd, the pieces No. 18, separating the end drawers and the pigeon holes; 3rd, No. 17, forming the bottom of the pigeon holes. It should then be an easy matter to fit the other pieces in any order preferred. I think it will be understood that each piece is to be pushed in from behind. All the parts should fit firmly and tightly, but without any undue strain which might distort them. The front edges should be uniform and set back a trifle under the top. The appearance will also be improved if they are rounded instead of being left square. The small shaped pieces which are seen at the top of the pigeon holes are principally for ornament. They are cut to fit accurately between the spaces, and are secured with blocks glued in behind them. With this exception glue is not required in fitting up this part of the work, unless, indeed, the drawers are considered as part of it. They, of course, must be glued up. They are made precisely as directed for the larger drawers, and in fitting them there is scope for a nice display of the joiner's skill. In

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worthy of the name of watch, and, like "Pindar's razors, made to sell." They are minus jewels, finish to wheels, pinions, etc., and with untempered springs. Such cause a vast amount of trouble to those who have to clean or repair them, and, worst of all, are costly to the wearer, who in time pays the original price in repairs. The best and most reliable watches are made at Clerkenwell, in London, taking all things into consideration, durability especially. I know many desire to give preference to the Waltham watch, but that matter was freely discussed a few years ago, across the water, and the decision was in favour of Clerkenwell.

It is astonishing how a well-made and finished Swiss watch will wear and keep the best of time, though it is minus the fusee wheel and chain that English ones have. Many that I have worn, and tried well, kept accurate time, and I could rely on them equal to any lever, though only horizontal movement. One I had—a Swiss lever—went the most accurate of any watch I had in my lifetime, keeping time to my satisfaction, and better than a gold English centre seconds costing £20. Its price was only £3. But for those who have hard work, or who are careless in using a watch, they are unfitted; a hunting-case Waltham or English lever would be the best, and prove a good investment in the end. Having a watch cleaned yearly in the fall, to pass through winter, clean and unclogged with dirt or oil, also to wind it regularly every night, hanging it up in position worn during the day, will give the best results. Sometimes hanging up and sometimes laying down will cause variation, no matter how good. Try it. By regularly cleaning, and not running them until they will run no longer, you will increase the durability of the watch. You may say, Why? Well, simply because the holes get ground in time to an oval shape by dust and dirt. Some men will boast: "My watch has had nothing done to it for three or four years." They are only showing their own folly. In the next paper I will show how to clean and repair the verge watch.

JOINTING UP—FOR "'PRENTICE HANDS."

BY DAVID ADAMSON.

PLAIN GLUED JOINTS (*continued*).

IN my first paper on this subject I showed what was necessary to be done in order to make a perfect joint, but space prevented me from bringing my remarks to a close at that time. I hope, however, to be more fortunate on the present occasion, and to find room to finish all I have to say on the plain glued joints, which after all forms the first section only of my theme.

Carlyle's well-known definition of genius may be applied to the artisan by slightly altering it, for it is quite certain that the best workmen are those who are most largely gifted with the capacity for taking pains. Even in "jointing up" much care may be, indeed, must be, taken if the work is thorough. The good practical workman takes all precaution to make it so, bestowing an amount of care which the clever amateur who is so handy knows little of. May I, without seeming ill-natured, just suggest to these latter, that they would get many valuable hints if they would be content to learn and listen respectfully to any practical mechanic, instead of trying to teach him, as so many do. Excuse the hint, my friends, who have done a little joinery, or as you may think it, possibly, a great deal. We won't cavil about the magnitude of your operations; but the probability is, that any artisan did more before he was "out of his time" than you would do in a lifetime. The skilled artisan, therefore, naturally resents advice from amateurs; but, on the other hand, is generally willing to assist in friendly conversation. You, the clever amateurs, generally know too much, and the bench hand is so well able to gauge your capacity that he does not care to waste his time by giving you information or discussing matters with you. He is certainly not the loser, and neither will you be if you approach him properly, and are willing to profit by his experience.

Is this little bit of plain speaking too straight for some of you? I hope not; but if it seems somewhat severe let me say that I have had some experience with amateur workers and with journeymen; and in writing these lines it is my desire to help the former by showing them how they may learn from the latter; at the same time, perhaps, indicating why their efforts to get information from practical mechanics may not have met with much success. There may be, and, doubtless, are, churls among these as in every other path of life, but I may with confidence say that the practical mechanic is by no means so reluctant to convey information, or to talk about his particular craft, as he is sometimes represented to be. I should say, perhaps, that I refer specially to cabinet makers as I am best acquainted with them, and though they are, from the nature of their work, among the highest class of craftsmen, I imagine others are not unlike them. They will resent instruction from those not competent to give it, for here in the workshop the tool handler is master of the situation, and he is by no means ignorant of it. Therefore, amateur, whether young or old, whenever you get a chance of seeing a good workman at work keep your eyes open and watch. You are sure to learn something. It has been said that women and fools should never see unfinished work, and there is no doubt that many men come under one or other of these classes—they must decide for themselves which, when they enter a workshop, by offering their valuable "suggestions." Let them keep these back, and they will be as welcome as they are the reverse when they don't. Once more I hope these remarks will be taken in a friendly spirit, however awkwardly they may have been given, and, if acted on, I am convinced that the hostile feeling sometimes said to exist towards amateurdom will be greatly diminished, if not removed altogether. But we left the boards while referring to the feel of a perfectly made joint, and, of course, if they are found to be all right, nothing more is required except gluing together. It is, however, extremely unlikely that the edges will be so truly "shot," *i.e.*, planed or worked up, as to be in contact at all parts. If they rock, from one or both being planed away more at the ends than in the middle, do not attempt to glue them; but if the boards meet at the ends, but not towards the centre, then if the space is not great no great harm will result. Look upon absolute contact at ends as indispensable; but though the same may be of advantage throughout the entire length of short pieces, it is not necessary, indeed is not advisable, for long pieces. The space must not, however, be great, not more than enough to put the contact at the ends beyond a doubt. Perhaps the best way of conveying a notion of the hollowness of the edge towards the centre, will be to suppose we have a couple of boards 5 or 6 ft. long, with edges perfectly true. Now with the plane remove a shaving or two, just the suspicion of one at its commencement, a few inches from the end of the board, till there is, when the boards are placed together, a perceptible space between them tapering from the centre to nothing near the ends. Even at the widest the space must not be so great that it cannot be closed by pressure of the cramps, within which the boards will be placed while the glue is setting. This is really all that it would be useful to say about planing up the edges, and much will depend on width, length, and other qualities; but, to sum up briefly, it may be said that the edges of short pieces should be "shot" straight, while long pieces should be hollowed towards the middle. Now for gluing the joint. Let the glue be good, freshly and properly made, hot, with cramps and wood handy, so that the glue, when rubbed in, may have no time to harden while getting ready for fixing the two pieces together. No precise instructions can be given for every possible case. Short pieces may not even require cramping, and a few general instructions will probably be sufficient. Practice varies, and I have no wish to name one procedure and ignore others. One great matter is to have the edges of the board warm, so that the glue does not chill as soon as applied, but remains liquid and sticky. They must not, however, be too hot, but there is not so much danger from this as from being too cold. Do not put too much glue on; a very thin coat well rubbed in is all that is necessary. If one piece is held by the bench screw, it may very possibly happen that the glue has hardened on it, or at least is not in its most adhesive state when the other is put to it. There might be a slight film on its surface, and, of course, this prevents it adhering as well as it might to the other piece. Well, just let this be sufficiently warm to melt the glue again, and the adherence ought to be perfect. It will thus be seen that the glue may, or may not, be rubbed on both pieces. When placing the glued edges in contact, do not be content with simply pressing them together, but having brought them cleanly together, slide them slightly against each other, lengthwise, using as much pressure as convenient. This expels any air, as well as a good deal of the superfluous glue, the presence of which, were it suffered to remain, would be fatal to a good joint. It then only remains to cramp the two pieces together, and let them remain till the glue has thoroughly set, when the boards may be worked on as if there were no joint. It may be news to some that a properly glued joint ought to be stronger than the natural wood, that is to say, on splitting a board by bending or pulling it ought, except perhaps in the case of some tough woods, to split at any part rather than at the joint. With ordinary pine or bay wood, if the fracture is along the joint, depend on it that the workmanship or the glue is at fault. Should such a disappointment await the novice who applies this test, it must not be overlooked that all glue must be removed before applying any more; in fact, the joint must be "shot" afresh. Attention will next be turned to the dowelled and tongued joints, but these must form the subject of a future "chat." Meanwhile, a little practice in planing up edges will not be wasted.

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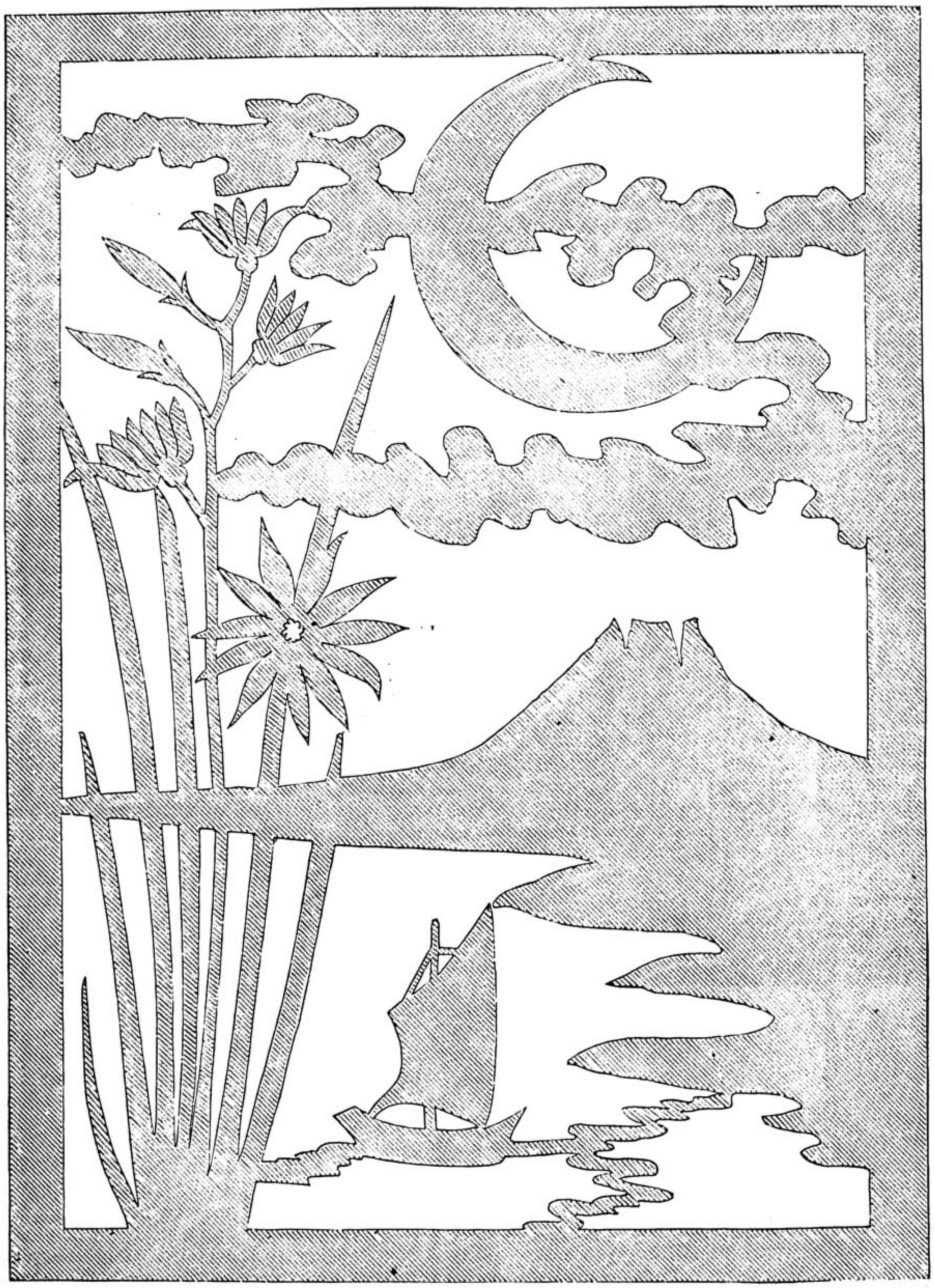
JAPANESE MOTIVE FOR PANEL IN FRETWORK.

BY E. BONNEY STEYNE.

To obtain new effects in a method so limited as fret cutting is less easy than it looks, especially if the taste of the designer forbids attempts at purely pictorial renderings of common objects, which, in spite of their popularity (if we may judge from their frequency in trade catalogues), surely contravene ever recognised laws of fitness. For in fretwork even the art of silhouette presentation can hardly be employed as felicitously as in black-and-white design upon paper. In pen-and-ink work the clear definite edge of the design is valuable beyond question to express any simple form; but in fret cutting the thickness of the wood itself insists upon being seen, and consequently destroys the clean exactness of the outline. Then, again, the contrast between the cut-out wood and its background is hardly likely to be as definite as in a printed silhouette; even though the wood be black and the white pure white, the cast shadows will come in and confuse the pattern.

Bearing in mind these limits, it is doubtful if such a design as this one given here can be strictly defended. In it an attempt has been made to conventionalise, after the manner of the Japanese, a subject that is very popular with those wonderful decorators. That the design in any way approaches the beauty of true Japanese art dare not be said, but that it is not quite so abjectly hideous as many a widely-diffused travesty of that inimitable school of ornament the limner humbly hopes. To cut a thing that shall vaguely suggest a landscape out of wood is not easy. "Would that it were impossible," do I hear you say? Very well; you can leave it still undone, and so assist in making it so. But if a rococo treatment of a square panel is desired, and if a somewhat distantly removed view of Fusi-yama, from the frequently-recurring native treatment of that sacred mountain, is not too gross a breach of good decorative taste, I beg leave to submit it with a thousand apologies. In flatly treated painting this typical presentation of certain forms, easily recognised as clouds, moon, mountain, water, flowers, etc., may be used with unquestionably pleasant effect; but in cut-out wood—unless the wood be very thin, and the saw very truly and rigidly kept to its exact line of cutting—I fear the result may be not quite so good. Yet if I understand the noble ambition to do something fresh, that characterises the supporters of WORK, they will be ready like many worse, ay, and even a few better, men (if, indeed, such could be found) to pardon its faults in view of its one virtue—unexpectedness.



Japanese Motive for Panel in Fretwork. (Scale, half size.)

For future use such a panel may form one side of a hanging lantern, the cover of a blot book, the upright back of a bracket, the door of a small cupboard, or a hundred kindred purposes. It may be left untouched by stain or polish, but only, I think, if in self-coloured wood with no vividly prominent pattern. Should the wood be mahogany or oak, it should be stained or gilded to avoid the conflicting lines of design and natural marking of the grain; either tending to destroy the force of the other.

The Japanese rarely use fretwork without a low relief carving of its surface. To put it less correctly but more vividly, it is pierced carving they favour to the exclusion of what we imply by fretwork. The fret ornament of their marvellously intricate lattice-work panels is veritable joinery, and built up of small bars of wood, not saw cut.

But a series of actual patterns from the land of the Rising Sun were lately given in these pages, and this proof of my own admiration for such, with its evidence in the attempt to rival the beauties of the original in a disrespectful parody, is English, you know, quite English. But let us be sure that the work so freely lavished upon our ornamental trifles is as good as the Japanese finish. It seems to me that ornament should never be used, unless it is good of its sort; a well-finished piece of cabinet work, exquisitely neat in its construction, is far better left unloaded by vicious ornament. But if the ornament is applied let it be well worked, for wood carving vigour and bold sweep of its curves, with the parts well massed, are more important than precise accuracy. But in fret cutting, which so narrowly escapes the reproach of being mere mechanism, and can only by very capable use be raised to the dignity of an art at all, extremely dainty finish is not only pleasant but absolutely necessary to atone for the intrusion of a pastime like the craft of the schoolboy in honest cabinet making. Therefore, for all such work used to adorn a larger structure grudge no labour, use fine saws, keep conscientiously to the line of the pattern—the whole line, and nowhere but on the line—going as fast as the Flying Dutchman if you can, but never leaving the line. Then let the file and sand paper be used unsparingly. And if your design is a good one, and the tracing itself geometrically true, and a duplicate, if not an improvement on the published pattern—if all these items are done well, little fear but that the whole will be well done.

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small drawers such as these, it is not generally considered necessary to run the bottom into grooved slips. The grooves are cut into the sides instead, as it can hardly be supposed that these small drawers will be required to support much weight. The back of the bureau is now the only part of the construction which remains. If it is to stand against a wall, a back formed in the simplest manner will suffice. For ordinary backs, muntins similar to those for the long drawer bottoms are generally used, as this form is decidedly preferable to plain boards glued up to form one piece, without involving much more labour. After what has been said about munted bottoms, it will not, however, be necessary to explain the construction further. It may, however, be said that a piece of muntin must abut against each end of the bureau, and take, as it were, the place of the grooved slips in the drawers. The number of muntins is not important, but four, including the two end ones, may be named as about the quantity for a job the size of the bureau. They should be at equal distances from each other, and be fixed perpendicularly, not horizontally.

Matchboarding will answer every purpose, and as it can be bought ready ploughed and tongued—*i.e.*, "matched"—it is very convenient to those who wish to avoid a needless expenditure of labour. The back, whichever way it is formed, should be let into a rebate run round the top, bottom, and ends of the bureau, and be fastened down with screws. It is, however, quite conceivable that the bureau may be destined to stand in some position where its back could be seen, and in that case the matchboard backing, though serviceable enough, may be rightly deemed out of harmony with the appearance of the rest of the work. A panelled back will be more appropriate, though its construction entails more work than the other. Still, work if properly applied means value, so it need not be grudged. The panelled back should consist of an outer frame of stuff, say, 3 in. wide × $\frac{3}{4}$ in. thick, the ends fastened to each other by mortise and tenon. Within these there should be a cross rail and upright also secured by mortise and tenon, or dowels, the whole enclosing four panels, for which $\frac{3}{8}$-in. stuff will serve (see Fig. 20). The panels may be either fitted to grooves in the framing—be it understood these panels are sunk, and not necessarily level with the surrounding frame—or the framing may be rebated on the inner side, and the panels let into it and secured with beads. This latter will probably be deemed by most the easier of the two methods, and it is shown in section in Fig. 21, so clearly as to prevent any misconception. It will be just as well for reasons which I trust have been made sufficiently clear already not to glue the beads to the frame and the panels, but to fasten them to the former only. Such a back as this should be fastened in with brass screws, as they look better than the ordinary iron. The bureau may now be considered made, as far as wood working is concerned, and those who have carried out the instructions given will find themselves in possession of a piece of furniture they may well be proud of, for it is a thing that will last, being made on sound principles. In this respect it will bear comparison with a similar thing whether of modern or ancient date. Even if the finish is not equal to the best the constructive details are, and if they have been manipulated with anything like skill the bureau may stand a very fair chance of becoming in time a genuine old bit of woodwork. Put the date on it somewhere, my amateur friend. It may some day interest somebody when he wants to tell his own decrepid, incapable generation that a former one turned out only honest work. We know better, but the prospective antiquarian will not be the only one who has made a similar mistake, and an excusable one, if all furniture were as well made as the newly constructed bureau.

Perhaps before closing a few remarks on finishing may not be out of place. Handles are wanted for the drawers. Those on the lower part should be good substantial brass handles, two to each of the long drawers, and one to each of the smaller. Fasten them on with round-headed brass screws. The small drawers in the desk part will only require a small brass knob each, except the long centre drawer, which should have two. Similar knobs may be fastened to the ends of the lid bearers, which, by the way, I think I have omitted to say, should be prevented from coming quite out by wooden stops similar to those under the drawers, nailed to the side. Polishing, also, should be attended to, but of this nothing need be said at present. The lining of the lid, however, affecting, as it does, the comfort of the writer, should have some consideration. The usual lining, as I have stated already, is leather, commonly supposed to be morocco, but in reality skiver, a thin leather formed by splitting a skin. All leather, however, is apt to get hard, and though now looked on as somewhat old-fashioned a cloth lining answers the purpose better. It is quite as durable, and moreover is a softer substance, so that a sheet of paper may be written on without the necessity of a pad of blotting paper underneath. These considerations are, however, for the user of the desk, and he can line it either with leather or cloth as he may prefer, but whichever it is the colour should not be too bright, but something restful and not tiring to the eyes. I may say that if the appearance of leather is preferred to cloth, the principal advantages possessed by the latter may be gained by interposing a layer of flannel between the wood and the leather. The lining, either cloth or leather, should be fixed to the wood with paste applied to the wood, not to the lining. The paste of ordinary bookbinders is the best for the purpose, and it should be well rubbed in before the lining is laid on it. A convenient way to apply the paste is to put a little in a piece of Hessian, or similar coarse canvas, and to rub it over the wood. This canvas serves as a kind of filtering medium for the paste, and prevents any lumps there may be in it from getting on to the wood. The lining should not be trimmed at the edges till after it has been laid and allowed to dry.

Before concluding this article I hope to show how the plain bureau may, without altering its shape or general construction, be finished in various styles, such as those of Chippendale, Sheraton, etc., so that those who wish for a more ornate piece of furniture may gratify their taste. Sundry modifications in detail will also be suggested for the advantage of those who, though unable to formulate exactly what they do want, are able to recognise the fulfilment of their requirements when it is placed before them. In the meantime the "Lessons from an Old Bureau" will not have been studied without, let us hope, some benefit accruing to those who have been disposed to follow and think over my remarks in the same spirit in which they have been written.

HOW TO SHARPEN PLANES.

BY B. A. B.

Having had opportunities of helping many beginners in woodwork, I take the first chance I have to point out in Work the most common mistakes made by novices. It is not reasonable to expect a beginner to sharpen and set his planes, and yet how can he use them unless they are well set and sharpened? I recommend all young at the craft to take lessons in sharpening from a good workman, if they know one willing to instruct them; failing this, I will try to explain. Have a clean oilstone standing steadily on the bench with two or three drops of oil on it; observe carefully the angle at which the plane iron is set in the plane, and rub the iron on the stone lightly, with the chief pressure in the forward stroke, at an angle *less* than that at which the iron stands in the plane—that is, the left hand grasps the iron across, palm downwards, and the right hand holds the end, thumb uppermost; then be careful to keep the right hand lower than if held in the same manner in the block of the plane. Now rub lightly (if the iron is freshly ground very lightly), keeping the angle as constant as possible. This is the chief difficulty; wrist, elbow, and shoulder joints must each contribute some movement to make the hands a parallel motion. Do not stoop over the stone, or move the whole body. After a little rubbing feel the front carefully with the finger; if the steel has just begun to turn slightly forward, that is enough; if not, rub till it does. Then, laying the iron face downwards on the stone, rub this fine line of steel off by thrusting while rubbing—that is, chief pressure *from* you and against the edge. The face of the iron must be perfectly flat on the stone, and the fine line of steel must not be bent back by this last operation, but *removed*; if only bent back, try again with *less* pressure, both operations, till successful. It is obvious that any excess of rubbing only makes the "wire edge," as it is termed, too coarse, wastes time, and causes grinding to be needed sooner. Having sharpened the plane iron, screw the front iron on; first with the fingers, adjusting it about $\frac{1}{16}$ in. from the cutting edge. Do not let it pass the sharp edge, or it will injure its keenness; then with the head of the screw upwards, just close to, but not on the edge of, the bench, screw it as tightly as you can without letting the screwdriver slip.

Now get in a good light, and, with the plane in left hand, put the iron in, *holding it in* position with left thumb. You want the iron to project as much as the thickness of the shaving you intend to take off, or a trifle less, as the wedge now to be inserted and gently tapped with a hammer may, and most likely will, drive it out a little. The plane, on trial, should now work well, but if not, try to find out why it does not. You will easily remedy the defect if you are careful in the investigation. A likely fault is that the iron is sharpened obliquely, consequently giving a coarse shaving in the corner of mouth, where it can less easily escape, and leaving a series of furrows in the work.

It may be sharpened well, and put in obliquely, there is a little liberty and you may have taken it in the wrong direction; the front iron may have slipped, or shavings may have got between the irons. Do not keep striking the plane, or the iron, or wedge, as most beginners do, blindly hoping it will presently come right. Find out the

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fault; remove iron and wedge, and put together more correctly, as above described.

When successful in setting, be sure to keep behind the plane; you have more power, and should you come to a hard knot you are less likely to hurt your wrist. You are to make more use of the left hand than beginners usually do, as the pressure on front of plane very much checks those vibrations which, leaving a wavy appearance on the work, also very much weary the worker.

Now supposing the plane well sharpened, the cap iron well adjusted and tightly fixed, and the cutting iron projecting just enough, yet the tyro may find a difficulty still. He may find, as he passes his fingers across the work, those furrows like a series of shallow rebates that quite spoil its appearance; he may tap the iron first one way and then the other without curing the evil. The reason is that the edge of iron is either straight, or worse—concave; if so, he can never plane a surface wider than his plane iron without these marks, which show, too, that he is a beginner by their tendency to the near front corner. The cure is to very slightly round the iron in sharpening at the corners (as in the annexed figure) only as much as the

Edge of Plane Iron properly sharpened, showing rounded corners.

stoutest shaving he intends to remove. I hope I have made this important point clear. Let me put it in other words. Suppose the iron quite straight as to its edge; say it is 2¼ in. (a fair average width for jack plane); let 2 in. *remain straight;* let the ⅛th at each edge be rubbed away, say $\frac{1}{40}$th of inch, at the corner. A shaving taken with a plane with iron so sharpened will not have a stout edge, but will gradually fade away to nothing at each edge.

Do not, however, in avoiding one error, fall into another; do not make the edge of the iron a segment of a circle in order to prevent the corners catching. Such sharpening is only allowable in planes for the coarsest preliminary work, and the beginner must aim at more careful sharpening.

Now, these two opposite errors may spring from one cause: viz., the inaccuracy of the oilstone. Given a wide oilstone used frequently to sharpen chisels upon, you soon obtain a stone that will cause the too rounding error, and if an attempt is made to rectify this error by rubbing the centre of plane iron on the marginal edges of stone alternately, as is often attempted, there is possibility of the opposite or concave error. The remedy is to rub the oilstone flat on a piece of paving stone with a little silver-sand and some water, taking care to dry the stone of water before again applying oil.

These directions for sharpening plane irons apply to jack, tying, and smoothing planes, and their fellows; not to rebate, moulding, or fillister planes. Rebate plane irons must project equally across the sole of the plane, and must be exactly the width of plane; fillisters nearly the same; moulding planes should either be sharpened so that the iron projects equally all over profile of moulding, or else *slightly* more projecting at the leading parts. For instance, say a bead: if the part of iron making the quirk takes off but little, and the hollow of iron which makes the round takes more, the worker finds it very difficult to make a good bead. Rapidity and good finish are best secured by leaving the quirk, the most projectant part of cutter, slightly more prominent than the rest.

If I have failed to make any beginner understand—and this article on sharpening is only for beginners—I will answer any inquiries; but in case any one fails, before asking try again, using less pressure on the oilstone, especially just as the finishing strokes are being made, as too heavy a pressure is a common fault among beginners.

BURGLAR ALARUMS:

How to Make, Work, and Maintain.

BY GEORGE EDWINSON BONNEY.

AUTOMATIC RELAYS—MAYFIELD'S ELECTRIC ALARUM BELL—DALE'S ELECTRIC ALARUM BELL—INDICATOR RELAY—PUTTING PARTS OF BELL TOGETHER—TESTING BELL—COVER FOR BELL.

Automatic Relays.—The action of an automatic relay will be more clearly understood by referring to the plan of one shown at Fig. 35. This relay is similar to that shown at Figs. 28 and 33. The trigger, L, of the relay is here shown on the face of the bell base, released from the catch, G, and drawn by the spiral spring into contact with a piece of brass, H. This piece of brass is connected by a wire leading up the back of the bell base (the course is shown by a dotted line) to the binding screw, B, and this is connected by a wire with one of the terminals of the battery, M. The other terminal of the battery is connected by a wire with the binding screw, A, and thus the local battery is thrown by the relay into short circuit with the bell, which is by this means rendered independent of current from the main line battery. When the circuit of the main line battery is closed by the act of opening a window or door placed in circuit, the current passes from A to D, then through the magnet coils to E, F, by the armature spring, to the contact post, K, then to C, and back to battery. As the current traverses the magnet coils, their cores attract the armature, and with it the hammer shaft; this movement causes the catch, G, to slip away from the end of the trigger, and the spiral spring at once brings it in contact with the small lug of brass, H. The lug, H, is connected with the binding screw, B, by a short length of insulated wire passing up the back of the base (its course is marked by a dotted line). The lever connects H with its pivot, I, and this is connected with the contact post. To render the action clearer, I must first explain that a wire is carried from A to D at the back of the base, and is brought up through a hole at D, and there connected with one end of the magnet coil wire; the other end of the wire is carried down through a hole at E, and connected to the metal frame of the bell by the screw, F. As the frame and the armature spring are connected together at S, the result is the same as it would be were the wire connected direct to S.

Mayfield's Electric Alarum Bell.—Fig. 28 shows an electric alarum bell, fitted with automatic relay, as manufactured by Messrs. Mayfield, Cobb, & Co., 41, Queen Victoria Street, London, E.C. The interior fittings of the instrument are similar to those shown on the plan, Fig. 35; but the relay is neatly placed in a recess cut out at the back of the base, as shown at Fig. 33. The fittings are well made, and are mounted on a metal frame, fastened to a base of polished teak, whilst the whole is protected from dust by a polished cover, made out of the same wood. The bell has a 3-in. gong, highly polished and nickel-plated, giving a good tone when rung. The instrument may be worked with current from one cell of the Gassner battery, sold by the same firm. I hope to give a notice of this battery further on.

Dale's Electric Alarum Bell.—Another form of electric alarum bell, fitted with automatic relay on the same base, is shown at Figs. 29 and 30, which illustrate a bell manufactured and sold by Messrs. Dale and Co., 26, Ludgate Hill, London, E.C. Fig. 30 shows the instrument with its cover off, exhibiting the interior fittings and working parts. It will be seen that the relay differs in form from that of Messrs. Mayfield, and is attached to the face and frame of the bell between the gong and the magnet coils. It is composed of the peculiar shaped trigger, shown at Fig. 21 (page 280), mounted on the pivot pillar, Fig. 11. This pillar is connected by a short piece of insulated wire, passing under the magnets, with a strip of brass attached to the right-hand binding screw of the instrument. A short contact post is inserted in the neck of the metal frame near the gong, and insulated from the frame by a wood collar. The tip of the screw from this post is made of platinum, and this comes into contact with another piece of platinum soldered to the trigger, when this is drawn to the post by the spiral spring. This post is connected with the middle binding screw by a piece of wire passing up the back of the base. The hook of the trigger engages with a catch attached to the armature, shown at Fig. 20, when the bell is set with the relay as an alarum. The action is similar to that of Mayfield's relay when the circuit is closed.

Indicator Relay.—When a house is furnished with a complete system of burglar alarums, with every room protected by suitable contact pieces to the windows and doors, the owner naturally wishes to know how he may locate the room into which the burglar has broken. Having been aroused in the dead of night by the ringing of the alarum, must he arm himself and search the house from top to bottom until he finds the thief, or the thief pounces upon him? He need not do so if an indicator relay or a set of these relays are placed in circuit with the various rooms. A neat polished case with glass front, containing a set of relay indicators, may be hung up on the wall near the alarum bell, and a glance at this will tell at once which room has been entered, or which door or window opened. Fig. 31 shows a small case of indicator relays, manufactured and sold by Messrs. H. Dale & Co., Ludgate Hill, E.C., and Fig. 36 is a plan of one of those relays mounted on a base by itself. In this form it is used as a single indicator, connected with a greenhouse or conservatory, either with a fire alarm or a burglar alarum. In the plan, Fig. 36, it is shown connected to one of Mayfield's circular bells, and worked with one cell of a Gassner battery. I may say in passing, that this well-made, excellently toned bell is quite an ornament to any room. The nickle-plated 4-in. gong is recessed into a disc of polished walnut, the edges of which are raised as a moulding around the gong. The gong serves the double purpose of a bell and a cover to the fittings beneath. I hope to describe its construction in a future paper when dealing with the broader subject of electric bells; the price of this is 9s. 6d. I have sketched this, together with Dale's

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relay and Gassner's battery, to show that this valuable instrument may be used with any form of electric bell, and can be worked with small battery power. The combination shown in sketch worked very well.

To show more clearly how this relay works, I have given an end view diagram of its working parts at Fig. 32, and this I will now explain. At the right-hand side of the plan, Fig. 36, will be seen a black knob connected to a brass rod. The end of this rod carries a curved brass lever, curved round so as to rest just under the lower edge of the indicator flag, D; a short transverse lever at H serves as a stop to prevent the curved lever from falling too low. When we wish to set the indicator relay, we give the black knob a sharp turn to the right: this brings the curved lever up smartly beneath the flag, and jerks it into the position shown at Fig. 32, with the white part of the flag covering the hole in the indicator case. In this position it is held by a pin projecting from the armature, A, engaging with the upper looped guide of the flag shown at N. When thus set, and contact is made in the main circuit by opening a door or window, the current from the battery traverses the magnet coils, B, B, magnetises the cores, C, C, of the magnet, and causes them to attract the armature, A. In doing this, the pin of the armature slips away from the guide, N, and leaves the flag without support, when it slips down the slide, E, to the bottom. As it does this, a stout, projecting pin, P, strikes the end of the thin brass spring, H, and forces it to break contact with the spring, I, above it, at the same time bringing it into contact with the brass spring, L, below it. (Both of these are guarded with platinum at their points of contact to prevent burning.) When this happens, the coils of the indicator magnets are out of circuit, and the current passes by an easier path to ring the bell, which it does with more vigour since relieved of the resistance of the magnet coils. As the flag falls, its upper or red part covers the hole in the face of the relay case, and shows at once the cause of the alarm. Any number of these indicator relays, up to fourteen, may be included in one case, and each number plainly marked as shown at Fig. 31, with a number corresponding with a number given to each guarded point, or the openings may have the names of the rooms printed beneath them. The bell may be stopped by taking off the switch shown at Fig. 36. In Fig. 31 this lever switch is shown projecting below the case. Any one of the indicator flags, or all of them at once, may be set by a sharp turn of the black knob at the right. The cover conceals all connecting screws, and is screwed on after connections are made; this acts as a deterrent to domestics who may have a desire to meddle and tamper with the movements inside the case. The switch is only turned on the last thing at night, when all doors and windows should have been previously secured. Should one of these be left open, or unsecured, its indicator will at once fall, and the bell ring until the faulty point has been properly guarded. Arrangements to guard the various points will be considered in a future paper.

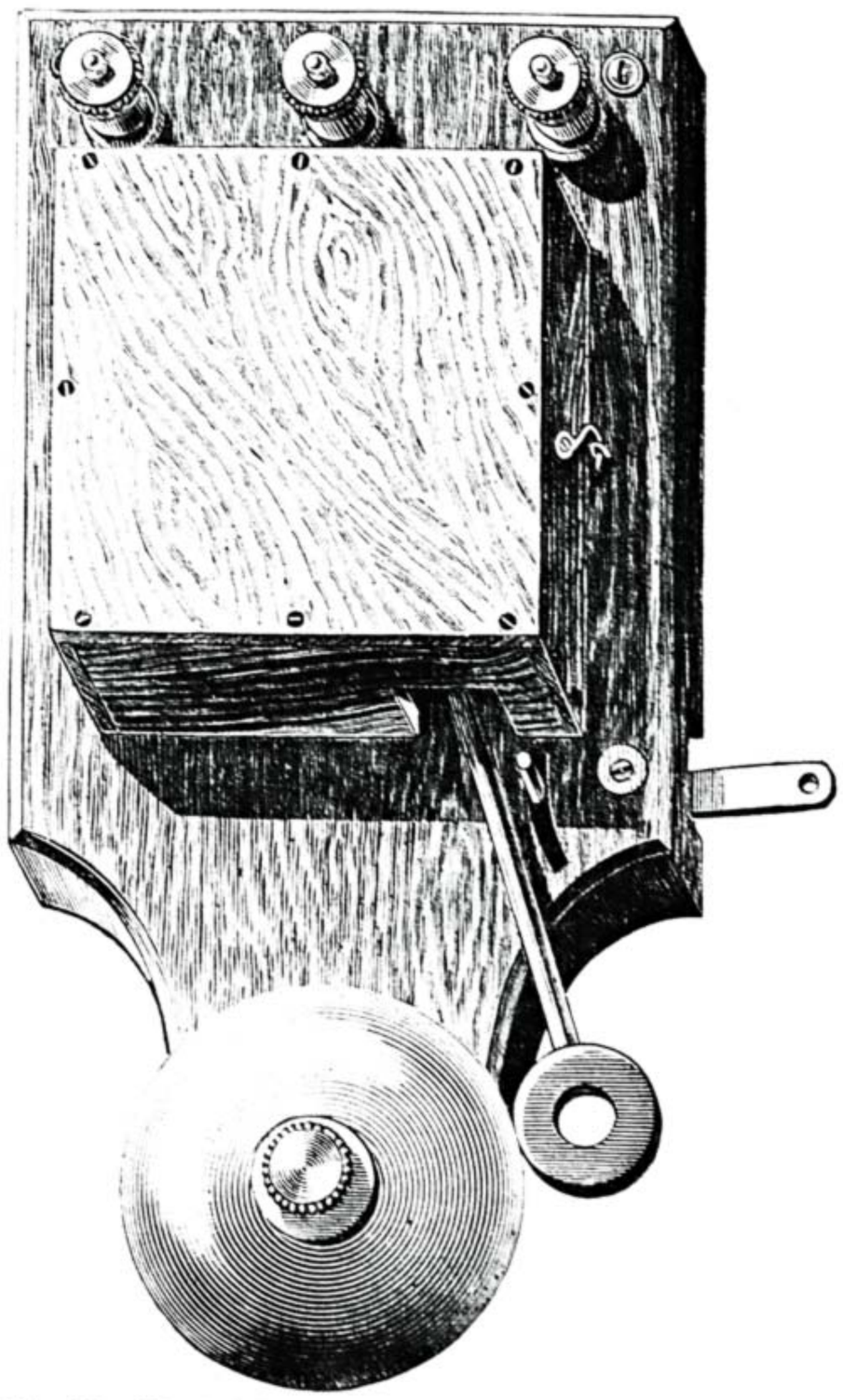

Fig. 28.—Mayfield's Alarum Bell with Automatic Relay.

Putting the Parts of a Bell together.—Supposing, now, that some of my readers have determined on making an electric alarum bell for themselves, and have got together the necessary parts mentioned in preceding chapters; we will next set about putting them together. But first let me say that each part must be proportionate; the metal frame suited to the base; the magnet coils and cores to the size of gong; the armature for the magnet; the spring of the right length and stiffness; and the hammer shaft sufficiently long to properly ring the bell. The relay must also be suited to the style of bell employed; but on this point much latitude of choice can be given, for the parts may be modified to suit each other. The right proportions for each part are given in pages 279 and 280, and most of the sketches of these parts are sketched full size to suit a 3 or 4-in. gong.

The metal base plate should have countersunk holes for the heads of the screws used in fastening this to the wood base; fasten this part on first. Next fasten the yoke of the magnet to the base plate; then attach the cores to the yoke, and slip the wound bobbins on the cores. Strip off the silk covering from the

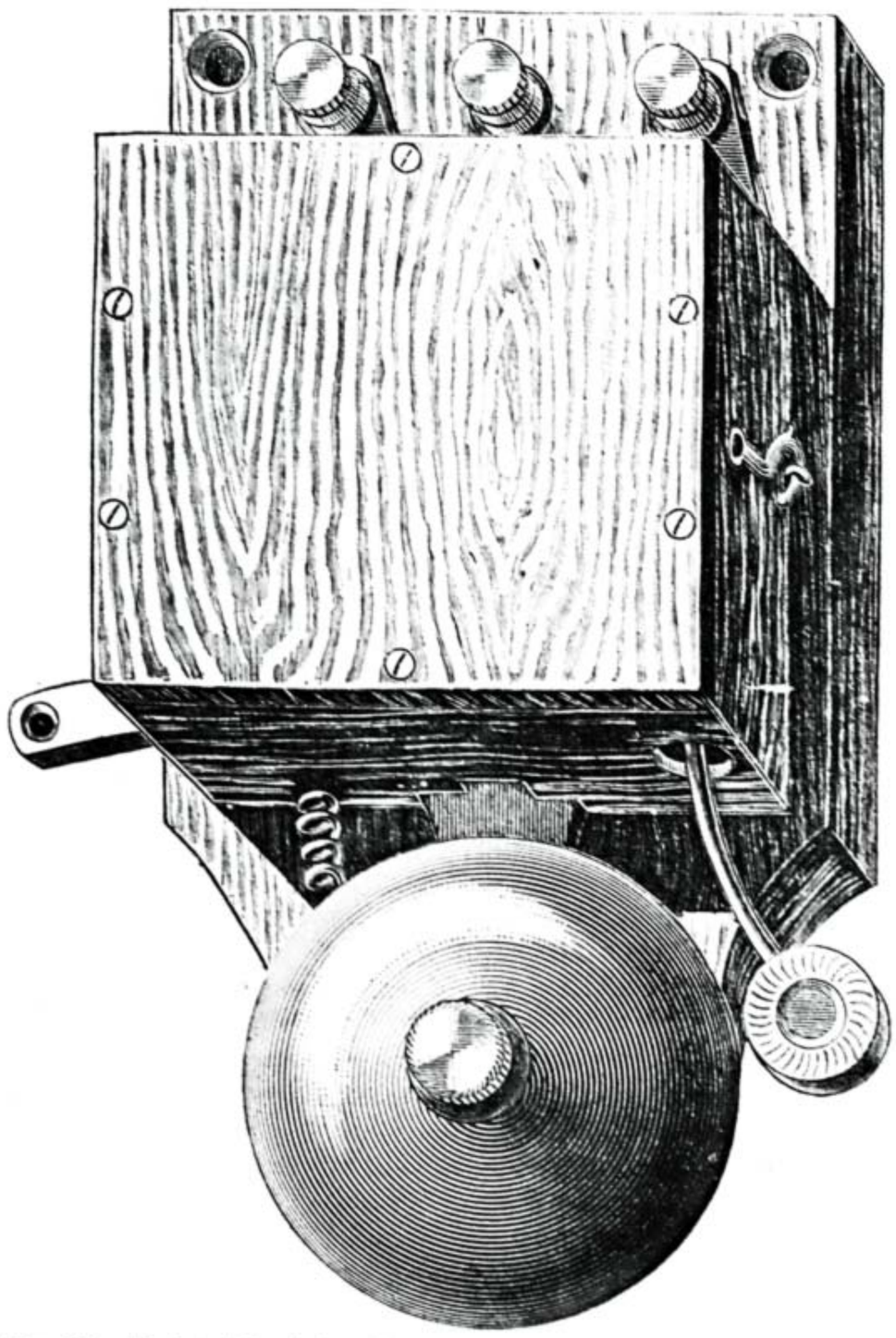

Fig. 29.—Dale's Electric Alarum Bell, Closed as when Fixed in Position for Use.

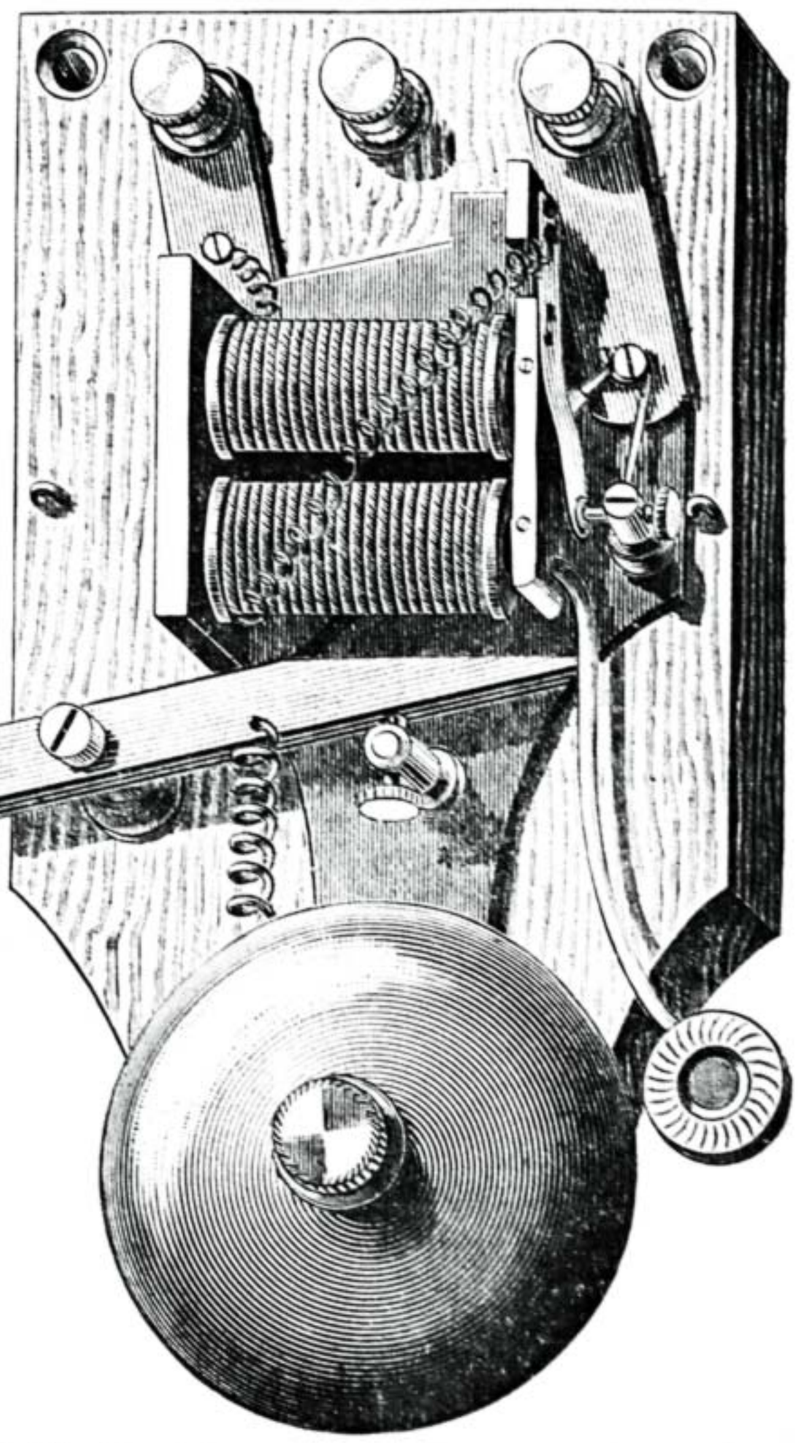

Fig. 30.—Dale's Electric Alarum Bell Uncovered, to show Automatic Relay and Working Parts of Bell.

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inside ends of the two coils, clean the wires on a bit of emery cloth, and twist them together as a rope is twisted. Serve the outside ends of the coils in a similar manner, and attach one of these to the left-hand terminal, or binding screw, of the bell (see Fig. 35), and fix the other to the metal base plate or to the lug carrying the armature spring; in both cases with metal screws—clean metal touching clean metal. This done, fasten the armature to its spring, and this to the lug on the base plate by small steel screws or screw studs. The hammer shaft should be previously inserted in the end of the armature, and if the relay shown at Fig. 30 is to be used, the catch shown at Fig. 20 (page 280) should also be fastened to the armature before this is mounted in position. The contact

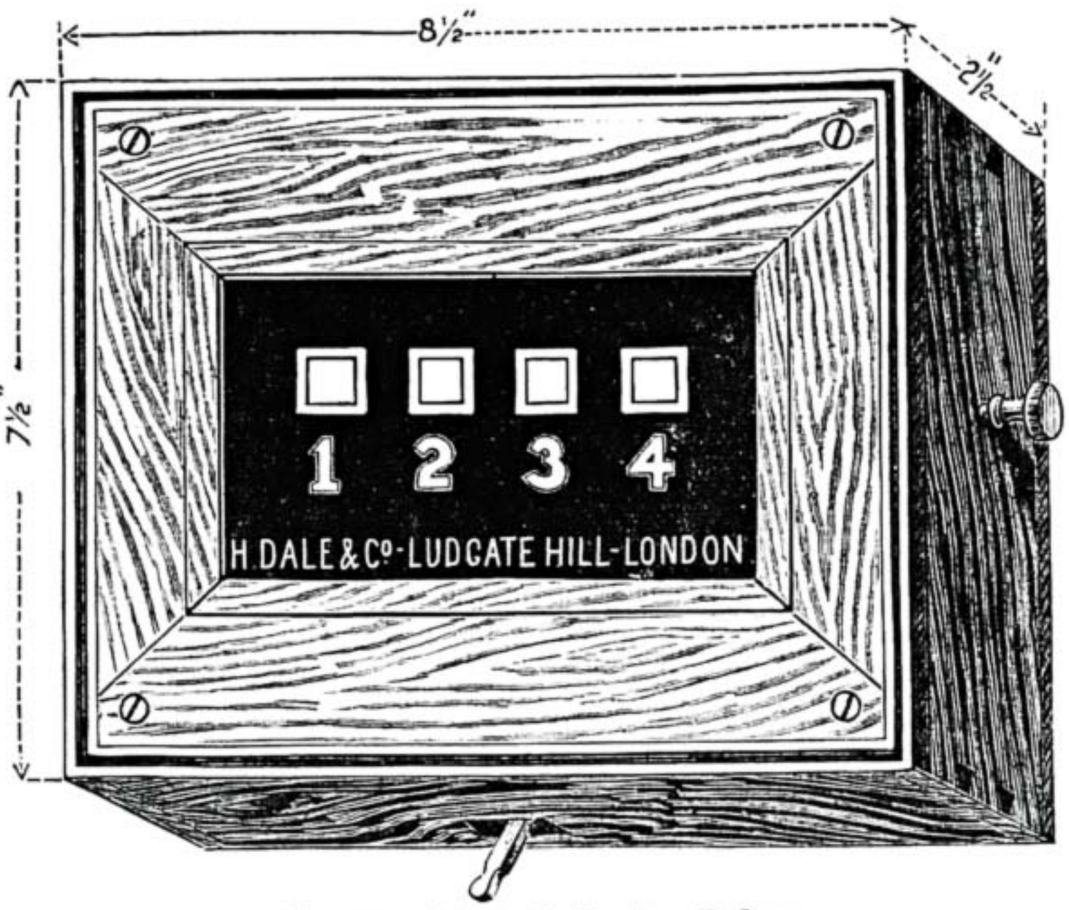


Fig. 31.—Dale's Indicator Relay.

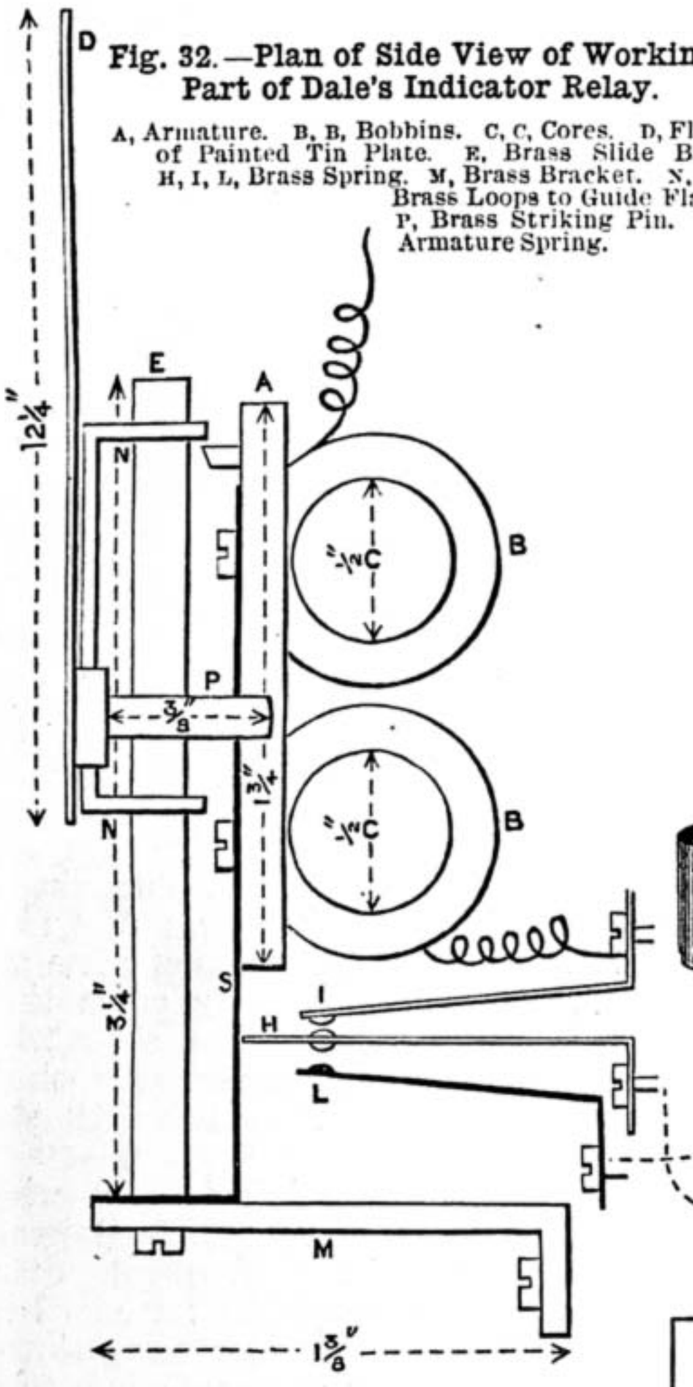


Fig. 32.—Plan of Side View of Working Part of Dale's Indicator Relay.

A, Armature. B, B, Bobbins. C, C, Cores. D, Flag of Painted Tin Plate. E, Brass Slide Bar. H, I, L, Brass Spring. M, Brass Bracket. N, N, Brass Loops to Guide Flag. P, Brass Striking Pin. S, Armature Spring.

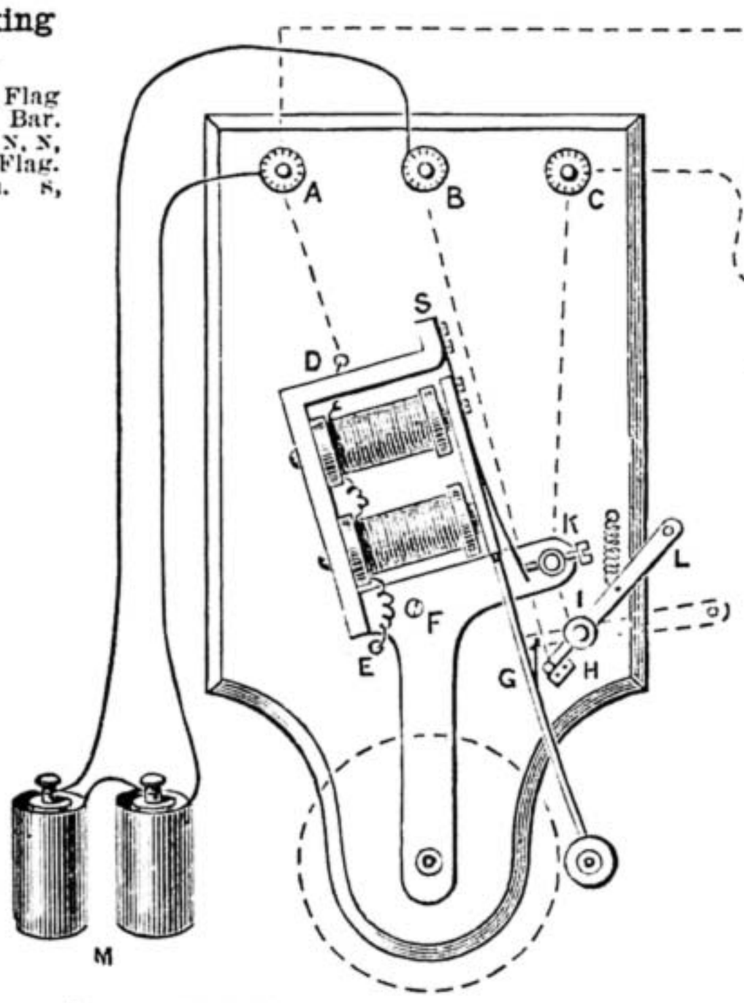
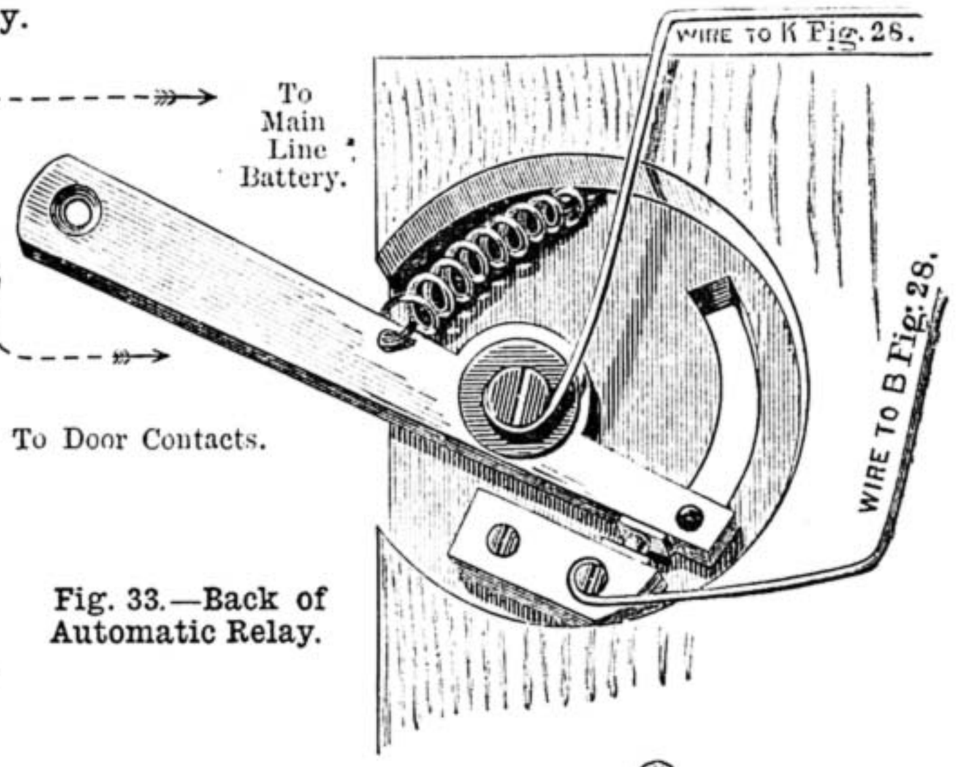


Fig. 33.—Back of Automatic Relay.



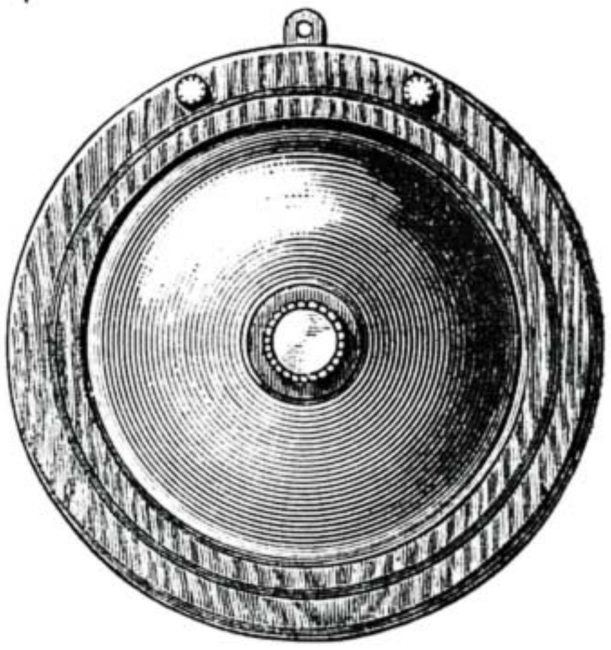


Fig. 34.—Mayfield's Circular Electric Bell.

Fig. 35.—Plan of Alarum Bell, showing Connections with Automatic Relay, with Local Battery and Main Line Wires.

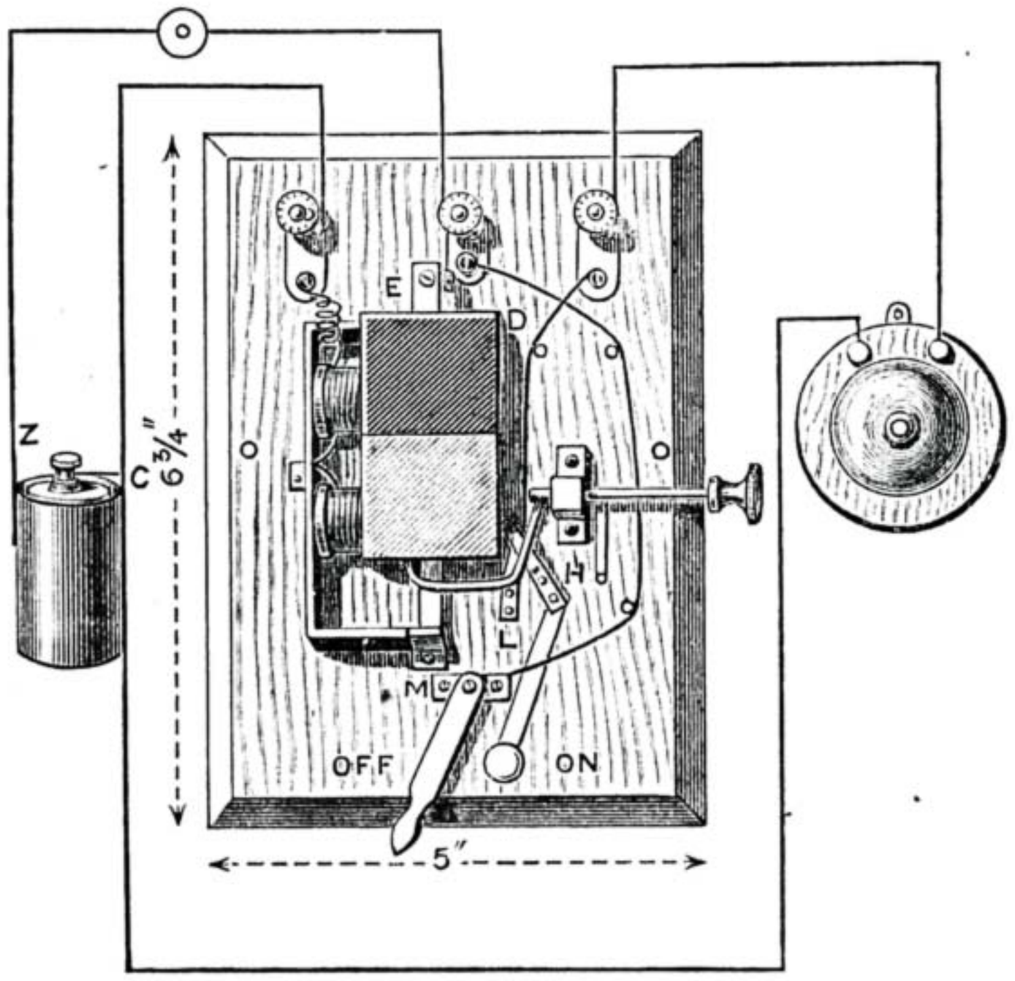


Fig. 36.—Plan of Interior of Indicator Relay, showing how to connect it with Battery and Bell.

The pin or the hook of the relay lever should not engage too deeply with the catch, but only just enough to hold it securely until the armature is vibrated with current from the battery. If it works too stiff the battery may fail to release it at the proper time, and if too tender it may be accidentally jolted into action. The right position can be found by actual practice.

Testing the Bell.—We may now set about testing our work. The three connecting terminals or binding screws, A, B, C (Fig. 35), having been screwed into the baseboard, the various wires are to be connected to them as shown in this figure, or in Fig. 30. It will be seen in both sketches that the central terminal (B, in Fig. 35) is connected with the contact post or piece of the relay; the right-hand terminal (C, in Fig. 35) is connected with the pivot post of the relay lever, and with the contact post (K, in Fig. 35) of the armature spring; whilst the left-hand terminal (A, in Fig. 35) is connected with one end of the magnet coil. All these connections may be made beneath the base of the bell, if so desired, to ensure safety from tampering, and for the sake of neatness. The wires are secured to the tangs of the various posts and terminals by small brass nuts recessed in the base, and the wires led along in saw cuts made in the back of the base. These recesses and cuts should then be filled up with paraffin or with elastic glue.

All parts having been connected, test the bell by trying to ring it with current from the battery. Adjust the contact screw of the "break," either by screwing it up tighter or unscrewing it, until the best tone is got out of the bell. If the armature

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strikes the magnet cores with a tapping noise as it vibrates, bend the spring a little outward so as to move it further away from the cores. If it vibrates feebly, bring this part nearer the cores by bending the spring inwards. It may be necessary to bend the hammer shaft a little, one way or the other, to ensure it striking the gong properly. The battery power used in testing and adjusting the bell should be the same as that to be used in working the bell. A weaker battery might just work the bell and a stronger prove too strong to ring it well, whilst it might ring well with a strong testing battery, but fail altogether with a feeble current from a weaker battery.

The Cover for the Bell.—As the working parts of an electric bell are very delicate, and liable to be injured by dust and damp, they must be protected from these by a suitable cover. This is usually made from the same kind of wood as that employed in making the base of the bell. It is really a little wooden box without a cover, turned upside down over the works. It is made out of ¼-in. wood, neatly put together with dovetail joints or mitred corners strongly glued, and is highly polished when finished. Holes or notches are cut to allow free working of the hammer shaft and lever of relay. The cover is secured to the base by two small brass hooks screwed to the sides, and engaging with two small brass staples fixed in the base. The top part of this cover is attached to the frame by small brass screws, in addition to glue, to give it greater strength; these screws are shown in Figs. 28 and 29. Two holes (bushed with brass eyelets) are drilled in the base close to the outside terminals, and the bell is hung by means of screws passing through these, or by pins, to a wall or a partition.

SADDLE BARS AND SAFETY STIRRUPS.

BY J. CHARLES KING.

THE term "saddle bars," to attach stirrup leathers to saddles, is derived from the part of the "tree" which formerly held the stirrup leathers, the tree of a saddle being the wooden framework of a saddle, the "bars," one on each side, connecting the "pommel" and the "cantle" at front and back of "tree." This plan is still in use in some Continental and American armies for their cavalry.

Notwithstanding the improvements in much that pertains to horse gear, the saddle seems to remain much the same as it was a century or more ago in some of its leading points. A few improvements now and then slowly make their way to the front; amongst them are the releasing bars, or, as modified in form, "latches" have become the recognised term, as a spring is mostly used in the construction of them, to open and close a latch. In the hunting field this season, one lady and six gentlemen met their deaths by falls from horseback, and about six hundred were thrown, many of them receiving severe injuries; and it is stated that the accidents were to experienced horsemen and good riders, most of them young or in the prime of life. Some of the accidents were due to the riding habits worn by ladies catching in the pommel when they were thrown from their horses. The hinged pommel prevents this form of accident, or is supposed to do so.

The stirrup bars, or latches, are credited

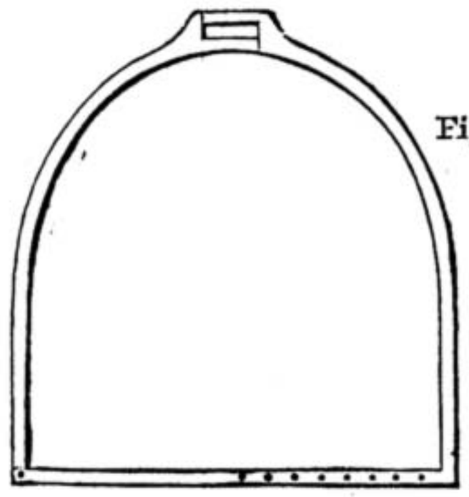

Fig. 1.

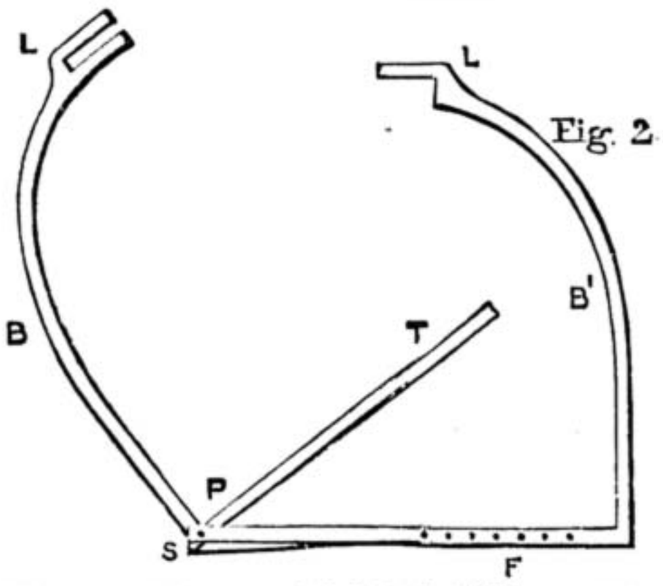

Fig. 2.

Fig. 1.—Stirrup with Joint at Strap-eye.
Fig. 2.—Same Stirrup shown half open.

with being the cause of many accidents, singularly enough from the very cause they are invented and patented for—"releasing a rider from the saddle;" but the patent goes on to state, "when thrown from the saddle, and preventing the rider being dragged by his foot in the stirrup." Now, being dragged by the stirrup holding the foot as in a trap is entirely prevented by the latch stirrup used by horse breakers and trainers for the past one hundred and fifty years; by the use of which the foot is released when hung up in it, without the chance of an instant's drag by it.

Fig. 1 shows such a stirrup, which, when new, does not show the opening joint at the strap-eye. In fact, it requires an expert to know if it is different from any other stirrup that does not open.

Why are they not general, as they suit for women as well as men? Simply because it is not the fashion; and many riders have little notions, easily swayed by their grooms and jockeys, about their saddle gear.

Fig. 2 shows the same stirrup half open; L L is an eye which is a jointed end of the stirrup bow, somewhat like a split ring, which gives the stirrup leather a release from the stirrup in case it is caught by a tree branch or a gate hook; this saves the saddle bar from being torn from the saddle, or the stirrup leather being broken. It will be seen that a portion of the tread of the stirrup, T, is solid with the bow, B. The other part of tread is solid with bow, B^1; this tread part is like the prongs of a tuning fork, between which the tread part, T, closes, and resembles an ordinary stirrup tread part, with its jags to prevent the boot sole slipping. The action is due to a pin at P going right through the prong-like ends of F, and the inner angle of the part that opens, F, B^1, L. As the bow gives way to the pull of the foot, the tread, T, rises and forces the foot free of the stirrup.

The actuating force which keeps the two halves of the stirrup close at the eye, L L, is a concealed spring, S, between the prongs of the tread, F. This is shown depressed at the point S, where it impinges with great force on the lower edge of the bow, B^1, at S.

We are pleased to hear that there has arisen a sudden demand for these stirrups, which cost about 18s. a pair of the best make; anything inferior should not be accepted. How is a buyer to tell? will be asked, and met with the usual advice, "Go to a good house and pay a good price." This is a poor assurance, seeing that the "good house" takes what the stirrup manufacturers offer; and if not good, the price becomes a fraud without the good house intending it. Here comes in the advantage, not of trade marks, but of grade marks, as of plate and swords, gun barrels, or any other thing capable of being tested. For about 2d. a pair a maker could get experts to mark the first, second, or third qualities to such goods.

But to return to saddle latches, which are desirable even with safety stirrups. We referred to accidents frequently occurring from the release of the leathers from the latches without the rider being thrown by his horse, but which caused him to be thrown by his faulty "latches" on his saddle. It would be only an advertisement to mention such, and they are numerous, and will be made and used till the simplest and best is found out and becomes generally adopted. What is known as the old spring bar is useful for a back pull, to allow the leather to come away from the saddle, but it is useless for a forward pull or overthrow pull across from one side of the saddle to the other.

A new saddle bar is patented about once a week in England, but they seem old patterns of worthless bars revived in too many cases.

The falls a man or woman get are not often serious if the distance the rider is thrown from the saddle is great. It is the short fall down from the saddle that is so dangerous, and the least hitch of the foot augments the force of the fall by the snatch turning the rider's head downward. Few of the latches serve for all kinds of falls. We illustrate one, as it embraces all that

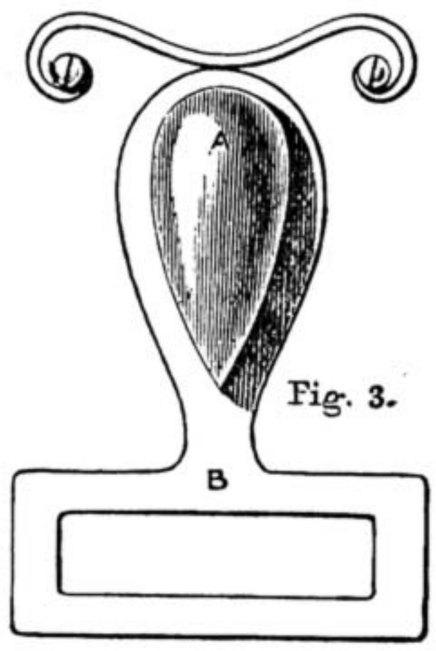

Fig. 3.

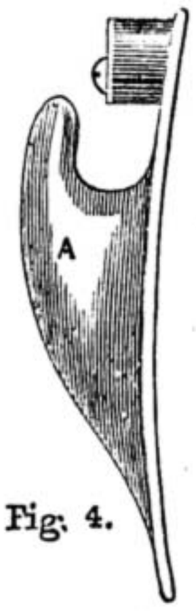

Fig. 4.

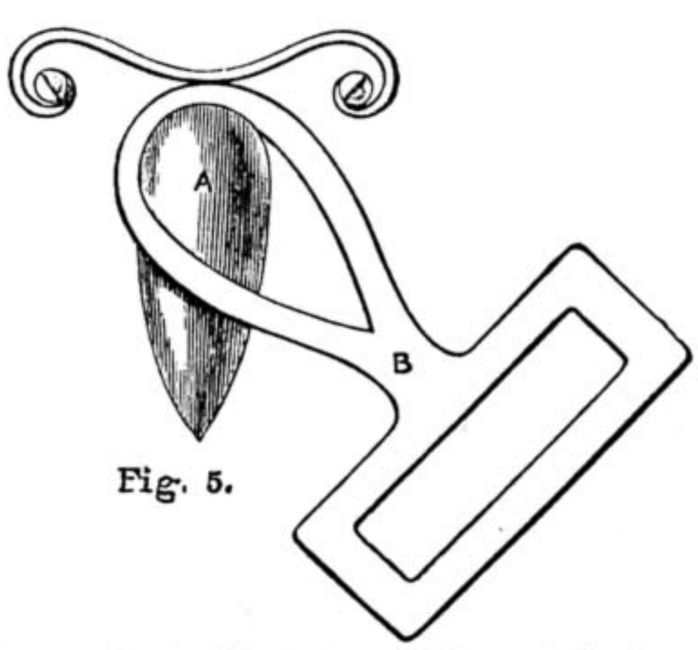

Fig. 5.

Fig. 3.—Stud (A), Cock-eye (B), and Spring for Stirrup Leather. Fig. 4.—Side View of Stud and Spring. Fig. 5.—Cock-eye pulled obliquely as when Rider is thrown or dragged.

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are of any worth, and has the advantage of being made at a lower price than any. The inventor, though patenting it with other saddle improvements, allows any lady or gentleman to have it put to their saddle by their own saddler, upon application for the permission. In this invention, the folding of the leather over the bar, which is the cause of breakage when worn, is entirely done away with; the leather is single halfway down to the stirrup; where it reaches the saddle it ends in a light nickel cock-eye, B, shown in Fig. 3; this hangs on to a notched stud, A, fixed to the saddle tree; a light cover spring, with bow and scroll ends fixed above it, holds the cock-eye down in the notch of the stud.

Fig. 4 is a side view of the stud and spring.

Fig. 5 is the cock-eye shown, being pulled obliquely as if a man were being flung out of the saddle with his foot in the stirrup, dragging the stirrup leather; a hard pull more obliquely is necessary to effect detachment of the loop from the stud. It is obvious that release is sure, whether the pull be backwards, forwards, or directly over across the saddle. If the sporting papers were to devote a little of their space to the records of faulty saddles and saddle bars that cause accidents, it might lead to the adoption of the safest to ride with, and save some valuable lives.

OUR GUIDE TO GOOD THINGS.

69.—The Rolymeter, or Automatic Measurer.

In the accompanying illustration a representation is given of a handy little instrument, to which the inventor and patentee has given the somewhat curious name of the "Rolymeter," from the principle of its action when at work—that is to say, the rolling of the wheels on discs that appear one at each end of the transverse portion of the appliance over the surface to which it is applied. As may be seen from the engraving, a short wooden handle, 4½ in. in length, including the portion that enters the brass socket immediately above it, is attached to a cylinder of brass which is fixed to it in a direction transverse to its axis, and at right angles to it. The cylinder assumes an octagonal form at and along the upper part, so as to present three flat sides, of which the central and upper one is slotted along its length to permit a pointer to travel along it from end to end. The surfaces on each side of the slotted surface are engraved with figures from 0 to 10, which represent feet; the central part along which the pointer moves being divided into ten parts, which in their turn are subdivided into fourths. Thus, practically, the graduated scale along which the pointer passes is divided into equivalents of feet, each foot space being again divided into parts representing 3 in. Through the centre of the brass cylinder a screw-cut axis passes from end to end, and to its extremities are attached wheels or discs, about 1 in. in diameter, with milled edges. The screw works in a traveller, to which the pointer is attached, and at each revolution of the side wheels the pointer passes over a space on the graduated scale representing 3 in., or ¼ ft. Thus, it will be seen, the Rolymeter is possessed of sufficient capacity for the measurement of 10 ft., after which the wheels must be canted to revolve in the opposite direction for the measurement of the next 10 ft., and so on. It will be found useful for a variety of purposes in which linear and superficial measurement is involved, and its use will save much time. Thus, in estimating the quantity of paper required for any room, the height and circuit of the room can be quickly determined by aid of the Rolymeter, and the area to be covered ascertained. The instrument has been submitted to me by Messrs. Richard Melhuish & Sons, 85 and 87, Fetter Lane, London, E.C., who will doubtless soon have them on sale, if they are not at present actually in the market. The price of the Rolymeter is 4s. 6d.

Automatic Measurer for Effecting Linear Measurements with Rapidity.

70.—Cook's Patent Level.

Another handy appliance which I have lately been permitted to examine through the courtesy of Messrs. Richard Melhuish & Sons, is Cook's Patent Level, manufactured by Messrs. Davis and Cook, Watertown, New York, U.S.A. For constant use in a shop I know of nothing more handy than this instrument, which is a plumb and level combined, enabling the workman to test the level of horizontal surfaces, and to see that vertical surfaces are perfectly upright by a half turn of one and the same appliance. I regret very much that it has not been possible to give an illustration of it, but its form and dimensions will doubtless be understood from the following description:—First of all, the body of the Patent Level consists of a piece of hard wood 16 in. long, 3⅛ in. wide, and 1¼ in. thick. This wood is secured from damage and wear-and-tear at each end by a stout cap of metal, nickel-plated, and attached by three screws—one at the end and two at the sides—the metal being bent, so as to extend ¾ in. up each side. On each side of the wood two circular rebates are cut 2½ in. in diameter, to receive nickel-plated rings rather over ½ in. in width. These rings are each attached to the wood by three screws, and the centre of the rebate in each case is 5⅞ in. from the end of the appliance. Within these metal rings are flat pieces of glass, which protect from injury the tubes which form the plumb and level. These tubes are placed in circular holes carried completely through the wood, the centre of the holes themselves and the centre of the circular rebate coinciding. The tubes containing the spirit and air bubble show a length of 1⅛ in. to the eye of the observer, and are 7/16 in. in diameter. They are set in a circular metal carrier about ⅛ in. in width, which is fastened to the wood, in the case of the plumb, with strong brass pins; these pins, however, do not appear in the metal ring that holds the level. A ring is painted round the tube on its external surface to indicate the level or plumb, as the case may be, by determining whether the air bubble is exactly central or otherwise. On one side of the instrument is a metal plate, also nickel-plated, and attached to the wood with screws; and in this plate are also two screws each marked "Adjusting screw," which are used to keep the instrument in perfect truth. The tube which is used in levelling is set parallel to its length, and that which is used as a plumb is set transversely to its length. The inscription, "This end up," on each metal disc that holds the plumb in place and protects it, leaves no doubt in the mind of the workman as to which end of the instrument is really to be kept uppermost when using it as a plumb. Its price is 10s. 6d., which is not a high figure, considering its manifest utility. It should be kept ready at hand for the use of workmen in every shop throughout the country.

71.—Cheap Mathematical Instruments.

There must be many a lad just commencing work, and men too, for a matter of that, who are not able to go to any considerable outlay in the acquirement of a set of mathematical instruments who will be glad to avail themselves of some cheap sets of German manufacture recently brought into the market. The cases which are before me as I write are respectively 7⅞ in. by 2⅝ in. by ¾ in., and 6⅛ in. by 2⅝ in. by ¾ in. They are covered with paper, grained in imitation of morocco leather, and are lined with cotton velvet. They are fastened by a pin working along the front edge of the box for half its length, and entering an eye fixed in the front of the lid. The smaller box contains a saucer for Indian ink, a cake of Indian ink, a pair of compasses with pen and pencil points, a small case containing leads for the pencil point, instead of a pencil, and an appliance for tightening or loosening screw at head of compasses. In addition to these are a small set square and graduated 6-in. rule, both in wood, retained in places made for them in the lid by means of a brass holder or button. The longer case contains, in addition to the articles already named, a ruling pen and a brass protractor. They are sold at 3s. 6d. and 5s. respectively.

72.—"A 1." A Magazine for Family Reading.

Part 19 of this magazine, whose aim and scope are sufficiently indicated by the above heading, has been sent me by the publishers, Messrs. S. W. Partridge & Co., 9, Paternoster Row, who call attention to two instructive and pleasantly written articles by Mr. Frank Rede Fowke—one on "Furniture and Woodwork at South Kensington," and the other on "Mosaic, Fresco, and Mural Decoration at South Kensington." Both articles are appropriately illustrated: the first giving examples of a Roman bed, or rather bedstead, and of a mediæval bed and chairs, and an illustration of a writing-table used by the ill-fated Marie Antoinette, the wife of Louis XVI. of France. Reference is made to a curious doll's house from Nürnberg, about 200 years old, and the *cassoni*, or elaborately carved chests which contained the trousseaux, etc., of Italian brides, and linen for the households over which it was their destiny to preside. In the second paper the most noticeable illustrations capable of being utilised as patterns are a piece of Indian mosaic from the Taj Mahal, and a specimen of sectile work from Monreale.

I find that I have omitted to say that Cook's Patent Level is made in different sizes ranging from 16 inches to 3 feet in length, and, as a matter of course, the larger sizes will be found better suited for general use in workshops. Prices range from 10s. 6d. upwards, but the progressive rate in price is not in proportion to the progressive increase in length and dimensions generally. The actual rate of increase has not been supplied, and so I am unable to state it.

The Editor.

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SHOP:

A Corner for Those who Want to Talk It.

*** Notice to Correspondents.—*In answering any of the "Questions submitted to Correspondents," or in referring to anything that has appeared in "Shop," writers are requested to refer to the number and page of number of* Work *in which the subject under consideration appeared, and to give the heading of the paragraph to which reference is made, and the initials and place of residence, or the nom-de-plume, of the writer by whom the question has been asked or to whom a reply has been already given. Answers cannot be given to questions which do not bear on subjects that fairly come within the scope of the Magazine.*

I.—Letters from Correspondents.

An Appreciative Subscriber.—H. H. W. (*Blackheath*) writes:—"At the end of the year will you issue an alphabetical index to Work? as I think it is well worth binding, and will be extremely useful as a reference. I fully appreciate its value; it explains everything so accurately and clearly that any one with the least amount of common sense cannot go wrong in following the instructions, and I sincerely hope that its circulation may increase more and more, as it will help numbers, and also show that the several articles by yourself and our other friends are thoroughly appreciated. I see in part for May 11th An Amateur complains of the advertisements. How a disfigurement? It is only one little corner, and I have found the information extremely useful."

About Work.—F. J. C. (*Brockley*) writes:—"Allow me to add my vote to those you have already received respecting the advisability of adding a cover to 'our' paper. I say 'our,' as I feel for my own part quite a personal interest in its success, and greet its appearance each Wednesday morning with joy. The suggestions *re* cardboard covers for the weekly issues are all very well for those who only look at the paper at home; but I for one have a copy as my constant companion in the train, and elsewhere, and by the time the week is over my poor Work is in a sad state about the corners where it has been doubled to go into the pocket. Now, a cover would certainly be a great protection; it would help to keep the paper for binding after being read, and would do away with the necessity of binding all the advertisements with the volume. A paper cover would also have greater space for the advertisements, which would more than pay for the extra expense involved in its adoption."—[A contributor to Work, when with me the other day, told me that he always bought two copies of Work, one for daily use at the time of publication, and the other to be put away for binding. As Work is issued at a very low figure, and contains an amount of technical information that cannot be found in any other paper, I venture to suggest this course for the adoption of yourself and others, who wish to preserve Work entire and intact for binding. It is impossible, as I daresay you know, to eat your cake and have it too.—Ed.]

About Work.—Alexis writes:—"It was with great disgust that I read the tirade of J. P. A. in the issue of June 8th, and with your permission I should like to have a cut at him. He seems, from his letter, to think that all the information and instruction promised in the prospectus was to be found in the first number, and because he found nothing to suit him condemns the whole thing. How selfish to complain because full instructions are given to make what he calls trifles, or to expect that all articles, whether cabinet making or anything else, are to be written up to the level of the professional. I flatter myself that in my own trade I am as good as the next man, but I expect to learn something from Work, and I reckon that J. P. A. will, too, if he continues to take it in. Then with regard to his advice to the editor to follow on the lines of the 'Technical Educator,' and Dr. Dresser, and Professor Church, and so on, I fancy that for every one subscriber gained of the J. P. A. kind there would be fifty leave it off. The *English Mechanic* is a good paper, but I am prepared to maintain that hundreds abstain from taking it because it is too scientific, and takes up too much space in discussing what I call fads, and though a subscriber to it for years I prefer Work, and I say long may it prosper, which I believe it will, in spite of the grumbling of a dissatisfied few."

Building Construction.—F. W. L. (*Norwich*) writes:—"I have pleasure in stating that I take the weekly numbers of Work by Messrs. Cassell, and have done so from its commencement, and can truly say it supplies information which has long been a want felt among our artisans in the building trade. I have read with interest the remarks of W. P. and A. E. D. (why don't they sign their names in full?) with reference to building construction in Work No. 13, and quite agree with them that it would meet with the great approval from many artisans, who, like myself (a bricklayer), wish to live and learn, but are debarred by excessive charges of art classes, and the dear rate of papers connected with the building trade. I wish your paper every success, as I know that Messrs. Jarrold in this city have a good sale for it."

An Opinion on Work.—Centre Bit (*Tullow*) writes:—"I like Work very much; it is a very useful paper. I am an amateur carpenter, and it is a great help to me, and by its aid I have turned out several very nice pieces of furniture described in it, viz., one of the small tables in No. 1, and the summer fireplace fitment. As a hint to other amateurs like myself, I enamelled it in Aspinall's electric blue, and then painted several of the Japanese designs in japan."

Fret Cutting.—A 'Prentice Joiner (*Glasgow*) writes:—"I enclose you two simple patterns which may meet with your approval, and others. I take a piece of white cartridge wall paper, lay it flat on top of pattern, get or take a flat piece of cork, or other soft wood, a piece of common upper shoe leather, 3 or 4 in. square; apply it to the cork as you would a square of sandpaper, rub back and forward on the top of the paper, and you will have a correct copy. Afterwards glue or gum it to the piece of wood you wish to cut it from."

Wrought Iron and Steel Girder Work.—H. W. (*Oakworth*) writes:—"I was rather surprised at Fen Mon expressing a hope that the paper on this subject should be discontinued. I assure him that this subject is well worth the room that it occupies. Though I am not in the trade I shall follow it till its completion. I wish all success to the editor and staff for all the subjects they are taking under hand."

About Work.—A 'Prentice Joiner (*Glasgow*) writes:—"For the first time your paper last week caught my eye. I bought it, and after perusing it I must say it is a valuable little paper for all classes of workmen, especially mechanics and young lads of the rising age; and by them carefully perusing it now when mind and memory are free, much could be learned and committed to memory, which would prove of incalculable value to them in after years, and a well-spent penny weekly. For as books so are papers judged, not by their covers, size, or number of pages, but by their contents. So, again, I wish your paper every success, and after this be able to have my penny always at hand and eye ready for your next coming issues."

Men Worth Knowing.—Help Each Other writes:—"I should like to add my share of praise as to the usefulness of Work, and must say I look forward to each Wednesday for a pen'orth of something fresh, and am never disappointed; if not exactly my hobby I always pick up some wrinkle, and though an old amateur joiner, etc., am always open for improvement. May I venture to recommend two makers with whom I have been in the habit of dealing? One of these is Mr. Massey, of Spalding, from whom you can get a good new 3-in. slide rest for 35s., and very well made. Doubtless, many readers, who, like myself, have their hobbies, will be glad to hear of such a cheap and good maker as I have found Mr. Massey to be. I should also like to recommend C. Pool, Hockley, Nottingham, as the cheapest and best maker and dealer in tools I have come across. I enclose my business memo., and can assure you I have not the slightest interest in either of these people, further than having had goods from them, and found them very good, and 20 per cent. cheaper than most people from whom I have had lists."—[Thank you for your letter. I am always glad to give the names of cheap and good makers. I have been compelled to omit part of your letter. You know, doubtless, what Mrs. Malaprop said about comparisons.—Ed.]

Chamfer Plane.—J. W. (*Burton-on-Trent*) writes:—"In page 61 of Work I see you give a description of a chamfer plane sold by Melhuish and Co., but you omit to describe one of its chief advantages, that it not only works the chamfer but cuts the stops. I made one myself about two years since from a working drawing published in the *Carpenter and Builder*, and can highly recommend it, for it saves quite half the time spent in the ordinary way, and cuts a nice clean stop, which is one of the chief points with a stop chamfer. If you like to insert this in 'Shop' it may induce some brother chips to become purchasers of a tool that I am sure they will prize. I wish every success to Work."

Wrought Iron and Steel Girder Work.—Boiler Maker (*Liverpool*) writes:—"I am surprised that Fen Mon should show himself so selfish as to express a hope that the paper on 'Wrought Iron and Steel Girder Work' should be discontinued. I have been taking in your paper since the first number was issued, and have been very much interested in all papers relating to wrought iron work, and I sincerely hope you will continue them. Also give us a little on boiler making and iron shipbuilding. There are plenty of subscribers in Liverpool who would be glad to read them. I may say I am deriving great benefit from your 'New Popular Educator.'—P. S. Excuse writing, as twelve months ago I could hardly write my name, and what I know now I owe to Cassell's papers."

Oil for Watches.—J. T. (*Birmingham*) writes:—"I see in Work No. 15 reference is made (in 'Shop' column) to watch and clock oil. I quite agree with your correspondent that Kelly's oil is an exceedingly good oil. But it is capable of improvement—viz., by mixing with another make of oil. At our works we use a deal of oil, and after repeated trials the best oil for watches (clocks I have never had much to do with) we find to be a mixture of Kelly's and Stretton's. Proportions, three bottles of Stretton's to two of Kelly's. It is extremely important that watch oil should be of the very best quality, as all in the trade know, and while each of the oils mentioned is good, mixed as above, they are all that can be desired, and if your inquirer will try them I feel sure he will endorse this opinion. Allow me, Dear Sir, to add my thanks for your excellent production, Work; it is the best paper I have ever met with. I wish you every success; you deserve the thanks of every mechanic, and I feel sure you have the thanks of all who know of your paper. We quite look for it week by week here. I hope soon to see some articles on the various branches of watch making; they would be very welcome in our works, I am sure."—[Articles on watch repairing are begun in this number. They will form the stepping-stone to papers of an advanced character for the professional workman.—Ed.]

Violin Clamps.—Wren (*Glasgow*) writes:—"I am glad to see that some of our violin makers are walking into the 'Shop.' I see in page 222 of Work that J. G. writes to E. P. W. on fiddle clamps. I say, with him, that it is a cheap method of making them; but I cannot agree with him in saying they give satisfactory results. If J. G. has no way of fixing his top piece of wood to the head of the nail, what is the outcome? It is this: if the bottom piece be the least tight round goes the nail with it, and where are you then? It is thirty-two years since I put a fiddle together with the same sort of things; but the way I screwed them up was with a screwdriver. They have more faults than that after being used some time. I have got the back and belly of a violin made, and working at the corner blocks and handles. This time if I can get screw nails to fit I will try another plan by running the top piece of wood hard up to the shoulder of screw; it will hold tight enough for all the pressure you need put on the lower piece of wood. The screw on the nails will require to be 2½ in. long. If they cannot be got I will fall back on the nails I have, and file off two sides of the head, then sink them into the top piece of wood, and fill up with glue and sawdust to hold them fast. There is a short article on fiddle making by H. P. in the *Boy's Own Paper*. He gives a drawing of a cheap substitute for fiddle clamps. It appears to be a piece of wire with a knob on the end of it; it is screwed up to the knob. There are two round pieces of wood; one is screwed up to the knob, the other on the point. He calls them shutter screws. I have been looking for them, but they know nothing of them in Glasgow."

Classes in Handicrafts.—H. N. (*Kingston-on-Thames*) writes:—"I have had sent to me a copy of your paper, Work, for June 1st. Allow me to state I was very pleased with it, and I have every sympathy with the effort you are making to extend a real and practical interest in such subjects. I wish to ask your advice, for I can imagine that from your position and your experience you and members of your staff would be fully able to give it me; or, if you think better, would you put my case in those useful columns at the end of your paper, where those who want information ask for it? My case is this. We have a club here for young men—many of our members are of a right, good sort—and we can count upon a certain amount of financial support; we have too certain offers of personal help from practical men. In this club the committee are anxious to arrange classes in handicrafts—*e.g.*, carpentering, brasswork, moulding; but we are rather shy of making experiments in the dark, for we are not practical men, and the first expenses seem very heavy. Can you, or any of your staff, or any of your readers, give us any directions how to make a start, or tell us of any place or institution where, in a small way, such classes are worked with some success? I must apologise for troubling you. I can only say your paper suggested to me this idea of seeking your advice."—[I think it to be the better course to give publicity to your appeal in this section of "Shop." I do so in the expectation that some reader of Work who has taken part in the establishment of such classes will write a paper describing the course of action he himself has taken, and the results of his experience. Such a paper cannot fail to be helpful to many who may be seeking to establish technical classes in town or country during the winter months.—Ed.]

On Trial.—E. Y. (*Liverpool*) writes:—"I cannot tell you how pleased I was when I first saw your advertisements of Work, or how anxiously I waited for the first number to come out. I have taken in several of your publications, from the first 'Popular Educator,' onwards, and was always well satisfied; so much so, that when I heard of Work, I said, 'Why, here's the very thing I want.' I am always trying to find out something I can make at home in my spare time, and, so far, I have succeeded very well, being rather handy with tools of all sorts; but I am sorry to say Work does not come at all up to my expectations, yet I can't very well say why. Anyhow, I am going to take in the first volume, and hope by that time to like it better, or be able to state my reasons more definitely; but at present I see so many letters speaking well of the paper that I am afraid there is something wrong with my judgment. At the same time I wish you every success with your new venture, and hope it may at least be a means of encouraging men to work at home and keep out of public-houses. I may just mention that I have lately bought a small lathe and fitted to it an arrangement for fret sawing, entirely my own idea, which will take in either fret saws or frame saws up to 9 in. long, and table wood up to 2 ft. square by ¾ in. easily, and truly square on edge. Some time I will try and let you know how I have done it. I hope you will excuse me if I have taken up too much of your time."

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II.—QUESTIONS ANSWERED BY EDITOR AND STAFF.

Advertisement Pages.—A WELL-WISHER OF WORK (*Kirkcaldy*) must kindly accept the reply given to AD FINEM, page 253, as an answer to his communication.—ED.

Clocks.—G. H.—(*Hetton-le-Hole*).—By sending your business card to Grimshaw & Co., 35, Goswell Road, Clerkenwell, you can get their illustrated price list of everything; or from Morriss Cohen, Kirkgate, Leeds, from either of which you could get most of what you require; while for clock wheels and parts you can't do better than J. Mayes, 55, Red Lion Street, Clerkenwell, of whom I get all wheels, castings, forgings, etc., for all the clocks we make.—A. B. C.

Mixing Plaster of Paris.—A SUBSCRIBER (*Birmingham*).—For ordinary casting plaster is always mixed with water. In waste moulding, the water for the inner mould should be tinged, and nothing is better for this purpose than common black ink—a few drops will suffice. It is well when thus tinging water, as also when colouring it with yellow ochre, Prussian blue, etc., for tinting an actual cast, to thoroughly mix the colouring matter with water in one vessel, and pour off into another for use, so that no sediment may be allowed to go into the plaster.—M. M.

Composition.—A. W. (*Great Yarmouth*).—The price per column of news (14 ems brevier), including distribution and corrections, is 8½d. per 1,000 ens. The cost of a column would depend on its length, which is not given in the question.—J. T. P.

Automatic Application of Brakes.—C. J. W. (*St. Mary's, Beccles*).—Your invention is simple and ingenious, and with properly-formed levers would work satisfactorily. The levers must be so shaped as to be actuated without concussion, but this detail you would settle before drawing your specification. Before applying for a patent I should advise you to have a careful search made to see if you are anticipated, as there have been so many patents granted in this connection that this question cannot be answered off-hand.—F. C.

Instructions for Making a Model Locomotive.—A CONSTANT READER (*Dublin*).—Your best book would be Pocock's "Model Engine Making," 2s. 6d. (Sonnenschein & Co.).

Circular Saws.—A. R. (*Scorrier*).—Those who criticise an author should be at the pains to ascertain his meaning. A. R. takes me to task *re* my article "The Saw: how to use it," page 162 of WORK, saying, I "am of opinion that himself (J. H.) nor any other man ever saw a hand saw with teeth as shown in Fig. 6, if so, I am confident that no man, let him be ever so skilled in the working of the hand saw, could work it either in soft or hard wood with rake there given." Now it so happens that I said the same thing, but in other words. I was comparing cutting action with that of scraping, and the words I used were, "It will be noted that the rake of the teeth" (the hand saw teeth in Fig. 1) "is such that there can be no true cutting action. For the teeth to cut truly they would require to be formed with a good deal of rake, as in Fig. 6. But the quantity of rake thus represented would unfit a hand saw for general work. Actually, then, the hand saw teeth are in principle an assemblage of scrapes, and as such they have little penetration."—J.

Bordering for Garden Paths.—T. H. C. (*Maidstone*).—It is difficult for me to say what would be the *cheapest* bordering for garden paths in your locality, because I do not know what local material may be available there. Edging tiles and cement coping in lengths are certainly expensive, and liable to be broken if spade or roller come in contact with them. A wood edging is not costly, for if you use 9-in. boards and rip them down the centre you will get 24 ft. run out of a board 12 ft. long, and the edging will be 4½ in. deep. If you use 6-in. floor boards, ripped down in the same manner, it would be even cheaper, if you can content yourself with a 3-in. edging. In Devonshire, the stone of the country, which readily splits into thin layers like

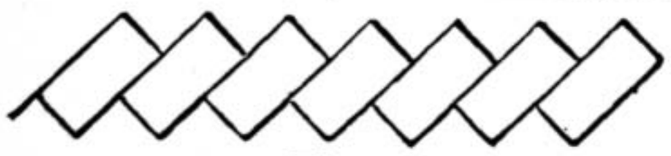


Fig. 1.

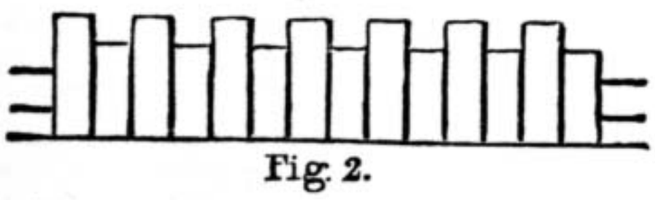


Fig. 2.

scales, is largely used; and slates themselves may be utilised in the same way; but to you, in Maidstone, they would prove an expensive mode. Flints from the chalk carefully set in the soil form a nice edging, though they are liable to get disturbed, and present a pretty appearance when backed by aulmetia, yellow or white alyssum, or any dwarf-growing plant. Box, I think, is as pretty an edging as any, its only fault being that it often affords a harbour for slugs, especially the small greyish-white slug. If you can get hold of a number of old bricks and have the mortar that adheres to them cleared off, you may make a good edging of them by setting them on end in the soil in a slanting position, as shown in Fig. 1. Again, a rustic edging may be made by obtaining a number of sticks, such as are used for staking dahlias, hollyhocks, and kidney beans or scarlet runners, cutting them into lengths, and stringing them on wires, as in Fig. 2. In this the sticks are disposed alternately in long and short lengths, but other forms may be produced. At intervals—say, from 12 to 18 inches—a long stick sharpened at the end should be introduced, to be driven into the ground to impart steadiness to the edging, and the intervening sticks should be long enough to be buried, say, to half their depth in the soil.

Galvanic Battery and Shocking Coil.—A. S. (*Falkirk*).—An instrument for "trying the nerves," as you express it, by sending through them a current of electricity, is named a "shocking coil." It is made up of a short coil of covered copper wire wound on a bobbin furnished with an iron core. Outside this coil is wound another very long coil of fine, covered, copper wire. The current from a galvanic battery is sent through the short coil and made to pass by way of a breaking apparatus or interrupter, which causes the current to go through the coil in jerks and spurts. These are transmitted to the outside long coil of wire, and sent by it through any part of the human body placed in contact with its two ends. The sharp jerks or tremors sent through the nerves are said to "try" them, because only those persons with a strong nervous system can suffer them to be thus shocked. A full description of this instrument would be too long for "Shop." If readers desire such a description, I will try to prepare an illustrated paper on this subject.—G. E. B.

Cracked Piano Sound-Board.—F. K. (*Hinckley*).—The reason your piano sounds thin from E♭'' to B♭''' is not because of the crack in the sound-board, but that your sound-board has sunk, and probably caused the sound-board to split. I expect it is weak just under the bridge, or it has had too much down pressure on it. You will have to strengthen it. Take out the backing material which is tacked at the back of your piano. Now you will be able to see the damage. Make some feather-edged pieces of soft wood and glue them in the crack as well as you can; then level it off; it will be rather awkward for you, as you will find the uprights in your way, but with patience you will get over it. Now, where you can get to it, glue and screw, with small screws, some pieces of wood 3 in. wide over the back of the bridge where it was split; use thin wood, such as is used for cocoa or blacking boxes, that you can obtain at some shop in your locality. Having done this, get three or four large corks—such as are used for quart bottles—and where you found the tone thin, cut the cork so that you will have to press it tight between the uprights and the sound-board—the tighter the better. This will have the effect of raising your sound-board up, and restoring the tone. Put one cork to every upright in the line of the crack. It would be better to do this after your pieces of wood have dried a day. It would assist me much in giving answers about pianos if the writer would state what kind of piano it is—cottage, square, or grand—maker's name, and whether new or old, wood frame or iron, as I wish these answers to be as complete as possible. If you would communicate the result to the editor it might help some other reader.—T. E.

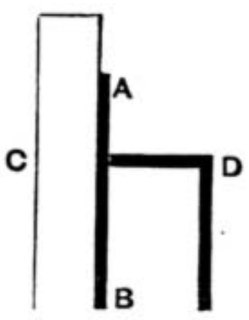
Application of Reeds to Pipe Organ.—J. C. (*Cannonburgh*).—There are many objections to the method you suggest of fixing harmonium reeds in the sound-board channels of a small pipe organ. One of the most important points to be considered, in order to make a harmonium reed speak properly, is its distance from the pallet hole; for instance, C⁴ must be exactly opposite the hole, and not more than ¼ in. below it; pitch C should not be more than an inch away from the hole, and half an inch below it; and 8 feet C should be about its own length distant from the hole, and 1¼ in. below it. Now, although your idea is to reverse the usual system, by having the reed above the pallet, it would still be necessary to keep the same relative distances between them. And then again, how would you manage to turn them? If you have made up your mind to adapt a set of free reeds, by all means let them have their own pan, and separate pallet action. I cannot suggest a method of doing this without knowing how your organ is constructed. If you will send a small sketch showing a section of the key, sound-board, and pallet, with position of bellows, I may be able to help you.—G. N.

Restoring Piano Keys.—H. W. (*Sheffield*).—The method usually adopted for restoring the colour of ivory piano keys is by planing, scraping, and polishing; but as I presume our reader may not be possessed of the necessary tools to accomplish it in this way, I must simplify the procedure. Raise the top of piano, draw forward the door containing the fret or panels, then you can raise the part which covers the keys; take this out, also a slip of wood which lays behind the keyboard. Having done this, you raise the key up, until it clears the pin in the centre; then draw the key forward. It would be as well to try a few at first and see the result. You will find them worn more in the centre of the piano, as it is used more; be careful not to rub through the ivory. Get 4 sheets of 1½ glass paper, also 4 sheets of 1, also 4 sheets of 0. Now lay these on a level table, or bench, take the key in your hand, and rub it on 1½ first, and then on the other two sizes of glass paper. This will take the scratches out; as you rub, give it a rotary motion; you will see it come whiter as you rub it; now serve the remainder in the same way. Now, to polish them you will require a piece of wood about 3 in. square, and wrap round it a piece of white flannel. Now get half a gill of methylated spirits, rub some whiting on your rubber, and sprinkle the spirits on, until it forms a rather moist paste; then rub to and fro quickly until you see the polish; now clear off all superfluous whiting with a damp cloth and wipe dry. Having done this through the set, take a little tallow candle and rub on the palm of the hand, and rub the ivory sharply; then rub with a soft cloth, and your keys ought to be white and polished. I should be pleased if you would communicate the result of your work.—T. E.

Reed Holes, etc., in American Organs.—S. M. (*Croydon*).—You cannot purchase American organ reeds separate from the board into which they are grooved; and even if you could do so, it would be impossible for you to make the reed board, as the boring of the cavities can only be done by very costly machinery. Both the reeds and reed boards have to be imported from America, for there are no makers of them in this country. They can be had in several sizes, the largest of which contains four 5-octave sets—viz., one of 16 ft., two of 8 ft., and one of 4 ft. pitch, and these are arranged so as to work with one pallet. 2-ft. reeds can be obtained by special order to the makers, but are not carried beyond top F. Very few makers of organs use them, as the effect produced is certainly not worth the extra work entailed in putting them in. It is difficult to give the size of the "exhauster" (erroneously termed the bellows) sufficient for 8½ sets of reeds, without knowing something of the instrument for which it is intended. To make a rough calculation, each primary exhauster should have a wind capacity of about 2,200 cubic inches, and the size necessary for this would be 2 ft. 4 in. long by 1 ft. 8 in. wide, with an opening of 8 in. at the widest part. The wind capacity of the reservoir should be nearly double that of each primary exhauster. I can supply you with a reed board, containing unvoiced reeds, at the rate of 10s. 6d. per 5-octave set.—G. N.

Making Electrical Dynamos.—H. E. A. (*Hackney*).—Electrical dynamos are machines for converting the dynamical force generated in any motor into electricity. Such a machine is furnished with two large iron electro-magnets wound with coils of insulated copper wire. These are named the "field-magnets." In their field—that is, within their influence—is caused to revolve a cylinder, or ring of iron (named an armature), wound with another coil of wire. The ends of this coil are fixed to a commutator, which arranges the current of electricity set up in the armature, and sends it around the coils of the field-magnets. The current is taken off from one end of the field-magnet coils and one of the brushes of the commutator. This, briefly, is a description of "the construction and action of an electrical dynamo." Doubtless it is valueless for the purpose you have in view. To understand how to make a dynamo you will have to read a long series of articles, or a book, on the subject. I can recommend to you Mr. Bottone's book on "The Dynamo: How Made and Used."—G. E. B.

Summer Fireplace Fitments.—KILDONAN writes:—"I am at work on the summer fireplace fitment described in No. 9 of WORK. Can you give any suggestions as to the construction of a fitment, equally substantial and tasteful, for a fireplace where the ribs of the grate project beyond the stone jambs and lintel, and the mantelpiece is not a plain pilaster structure such as his design shows? It is an old-fashioned affair, though elaborately ornamented, the pillars being very light, and shaped something like the architraves round a door or window, while above the lintel there is a series of alternate friezes and mouldings up to the shelf itself, which forms the finishing member of the topmost moulding. I cannot specify it as an architect would, but it is not suited for taking in a frame like that shown."—[I know precisely the kind of grate you mean. You can use the design just as it is given, and hide the gap caused by the projection of the bars of the grate by strips of wood of the proper width nailed to the edges of the top and sides of the fitment, thus boxing in the grate. To ensure stability in the fitments, I think sheet metal hooks, of which a side view is given in the annexed diagram, should be screwed on to the cross piece that holds the bracket, to hook over and on to the topmost bar of the grate. In this, A B is the plate to be screwed to the cross piece; C, shown in section; and D is the hook.—ED.]



Polish for Cedar, etc.—H. A. (*Batley*).—French polish is generally used as the finish for these woods. It may be made by dissolving shellac in methylated spirits—say, 4 oz. of the former to each pint of the latter. Bleached shellac should be used if white or colourless polish is wanted. Mahogany and open-grained woods should have the grain stopped by rubbing in a filling of some kind. Whitening and turpentine with a little colouring matter—such as rose-pink for the woods you name—to match the wood, is a very good one. To enrich the colour, the wood is generally oiled with raw linseed oil. The polish is applied with a rubber of cotton wool enclosed in a piece of soft rag, the finish being obtained by lightly using a rubber

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moistened with spirit only. Pencil cedar does not require any filling. This is an outline of the process, which, I hope, may help you. To give details would occupy more space than can be devoted to any subject in these columns; but, as you will have seen from answers to previous inquirers, a series of articles on French polishing, etc., will appear as soon as practicable in WORK.—D. A.

Polishing Dining-table Top. — W. H. B. (*Peterborough*).—The dead surface is produced by oil polishing. The process simply consists of rubbing linseed oil, and polishing with a soft rag. The oiling and polishing must be continued at intervals till the requisite shine is obtained. To get the best results takes time and friction. Oil polishing is not difficult, but it is decidedly fatiguing and tedious. The more the surface is rubbed the better, and the process may be extended over some weeks. —D. A.

Screw for Wooden Copying Press.—COPYIST.—You ask for "some simple method for making the wooden screw" for the copying press described in WORK by Mr. David Denning, "and the threaded block through which the screw revolves." The simplest method for you to adopt, and the best one too, is to buy one of any ironmonger and dealer in tools who keeps such things. You would get one for 2s. or 2s. 6d. These screws and the blocks in which they work are cut by what is called a box and tap, which would be costly for you to buy for the sake of cutting a single screw. You give me no clue to your place of residence, but if you live in a large town you might pick one up cheap among the odds and ends of some marine store dealer.

Hatching Machine.—G. P. (*Birmingham*).—I note your request for instructions for making a "hatching machine," or incubator, as it is generally called. At present the pressure on my space is too great to enable me to give a paper on it promptly, and it must form the subject of a paper, or even two, for it is not possible to deal with it satisfactorily in "Shop." Perhaps this reply will bring offers to write on the subject from some reader who has taken the task in hand for himself.

Subjects for WORK.—W. H. A. (*Gorton*).—For "Design in Textile Fabrics" you could not have a better work than the book of that name, by Mr. T. R. Ashenhurst, published at 4s. 6d., as one of the series known as Cassell's Technical Manuals. I am waiting for promised papers on the spinning wheel and simple hand-loom, as these are wanted in some of our Colonies. Then possibly we may go on to higher subjects in this direction. I cannot make any promise about oleographs and chromographs. If you want any special information with regard to their production, if you will state your difficulty I will endeavour to get it answered. I do not think it desirable to enter on the feeding and rearing of silkworms and their treatment, as there is no likelihood of the production of raw silk being attempted in this country on a large scale. It was tried, if I remember, some years ago, and the worms were fed on the leaves of the Ailanthus. Silk manufacture is different, but if I begin too many subjects at once, one will stand in the way of the other.

Watch and Clockmaking.—R. D. (*Rathgar*).—Papers on this subject will be found to be commenced in the present number. No specific promise of papers was made in the preliminary prospectus of WORK. It was only sought to give a list of the chief trades relating to which papers would be given at sometime or other.

Sheet Metal Working.—ST. MUNGO.—You will have noticed that a beginning was made in "Sheet Metal Working" in No. 17 in the paper contributed by Mr. Robert Alexander. Instructions will be given independently of these for the manufacture of fern cases, aquariums, etc. It is well to take care of the numbers of WORK, as the Magazine will constitute a valuable reference encyclopædia for workmen of all trades. I am not acquainted with any book that deals exhaustively with sheet metal work.

III.—QUESTIONS SUBMITTED TO CORRESPONDENTS.

Book Machine.—J. M. F. (*Dublin*) asks:—"Could any of your correspondents inform me where a machine could be had which would make an ordinary book rim with a single stroke?"

Rickety Table.—A. J. T. (*Holborn*) writes:—"Could you advise as to cure of above? It is a substantial two-leaved dining-table on castors. The legs screw on and off. If you happen to knock against it at tea 'over goes the show.'"

Model Engine.—W. H. M. (*Nottingham*) writes:—"Will some reader of WORK say if it is possible for an amateur to make a small gauge for model engine boiler about 1¼ dial, and to register about 30 or 40 to the square inch? If so, kindly describe its working parts."

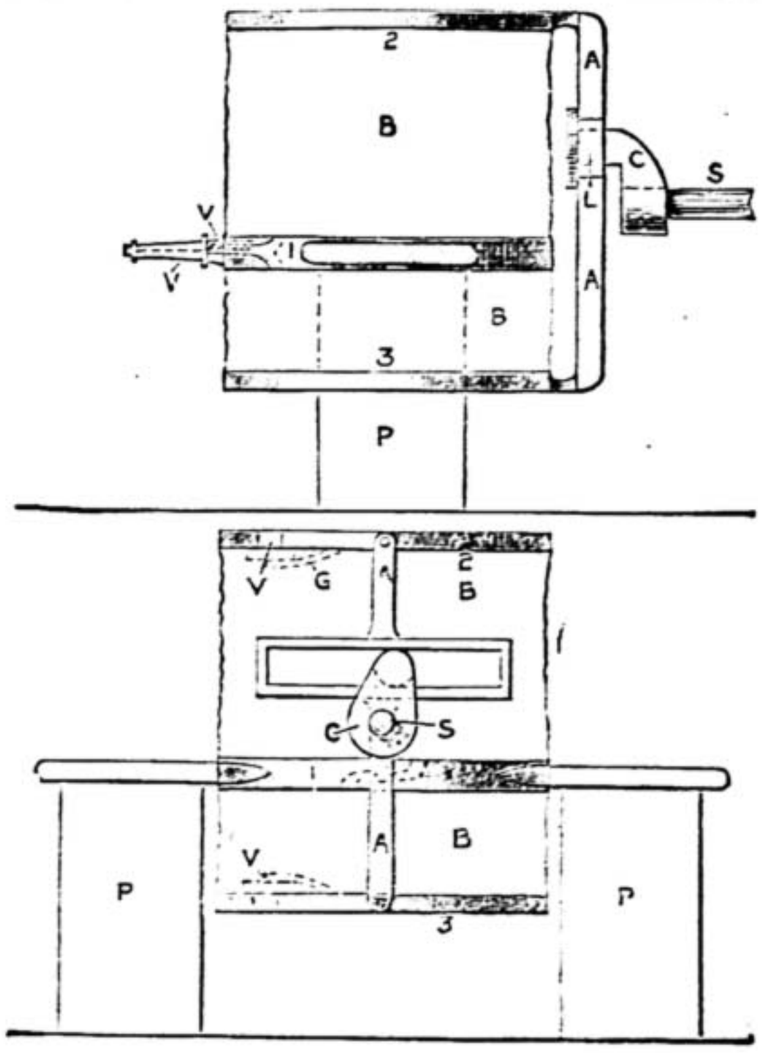
Paint on Leather.—J. B. S. (*Nottingham*) writes:—"Would a correspondent inform me how to prepare leather to receive paint, or how to prepare paint to put on leather, so that when the bag or portmanteau is in use it will not crumble off?"

Illuminating.—H. C. (*Lincoln*) writes:—"I wish to know how to illuminate upon parchment. Is there a preparation to apply to the surface before working upon it? I have been using ordinary moist pan colours; they are not sufficiently brilliant. I have also used the gold and silver in shells, but these are not satisfactory. I shall be grateful for help."

IV.—QUESTIONS ANSWERED BY CORRESPONDENTS.

Joiners' Composition.—A. F. W. (*Upper Tooting*) writes in reply to F. B. (*Guernsey*) (see page 158):—"I forward a well-tried recipe—viz., melt in a tin in the oven, or on top of a stove, 2 oz. shellac, 1 tea-spoonful resin, a piece of beeswax, size of half a walnut. When melted add any dry colour to match your wood, then pour out a little on a board and roll out in sticks like sealing wax. To use get a piece of iron or an old file, hot, not red hot; hold the end of one of the sticks over the crack or hole, apply the iron, and rub the stopping well in. Clean off with scraper and glass paper."

Machine for Current of Air.—C. H. (*Birmingham*) writes in reply to BELLOWS (*Gloucester*) (see page 190):—"I send enclosed sketch of machine of



my own invention, hoping it may be of use to your correspondent BELLOWS. 1 is a circular board which forms an end of each bellows; this board is stationary. 2 and 3 form the other ends of the bellows: S is the revolving shaft on which a crank, C, is fixed. The crank pin works in a grooved piece of iron, L, and as the crank revolves this is lowered or raised. Attached to this are two arms, A A, one fastened on each of the ends, 2 and 3. Then as one board is raised, the other is lowered, producing a constant stream of air. The nozzle is divided, and a valve placed in each side, so as to prevent the suction of one bag taking the air from the other."

Cleaning Oil Paintings.—C. H. (*Birmingham*) writes in reply to L. S. (*Lower Broughton*) (see page 190):—"I may state that hydroxyl (a compound of hydrogen and oxygen, which may be obtained of the principal chemists) will clean oil paintings, without injuring the colours, and restore them to their original freshness. The oxygen of the hydroxyl oxidises the lead sulphide (the blackening material) into lead sulphate, which is white, while all the original colours remain unaltered."

Blue Prints.—A READER writes:—"After reading in 'Trade Notes and Memoranda' 'An American writer's Note on Blue Prints,' it occurred to me that it would be greatly beneficial if blue prints could be coloured, thereby saving tracing cloth for shops, and lessening labour, the tracing from which print was taken being ready at any time necessary to make another print. I dissolved some soda in water, and used same to mix colour with, then applied to print. The soda in the mixture had the desired effect on print—*i.e.*, changing colour of print, and leaving colour on same as bright as when applied to drawing paper. I then followed our "Cousin's" directions regarding red ink, which I used for centre lines, and a similar method for blue ink, which I used for dimension lines. I was pleased to see they came out very clearly, and answered the purpose well. I afterwards used some soda water for figuring in the dimensions, but finding the solution blurred, I added a little gum, which overcame the evil, and good, firm figures, and clearly white, were obtained. I daresay this would be useful to some readers of WORK, as I presume the aforesaid are to be found in all branches of industry, and I should be greatly obliged if you would enter this in your column."

Organ Builders' Tools.—W. J. C. (*Clapton Park*) writes in reply to W. P. (*Grantham*) (see page 190):—"Noticing your correspondent's inquiry *re* organ builders' tools, I would suggest that he make inquiries of (or, if a resident in London, call personally at) Messrs. Thos. Syer & Co., 75, Chiswell Street, as I have often obtained through them things which I could not get anywhere else, and feel sure, from my own experience, that if they have not got in stock what our fellow-worker wants, they will get them for him, and think it no trouble."

Trade Notes and Memoranda.

THE Chelsea Public Library Commissioners have awarded their premiums for the plans sent in for the new building to be erected in Manresa Road, King's Road, S.W. The premium holders are—(1) Mr. J. M. Brydon, F.R.I.B.A.; (2) Mr. E. W. Mountford, A.R.I.B.A.; (3) Mr. C. Pemberton Leach, A.R.I.B.A. The proposed South-Western Polytechnic will probably be erected on a site adjoining this library.

THE California Electric Light Company, of San Francisco, has erected at the Chollar Mine the largest electric power plant in the world. It comprises six 120-horse power Brush dynamos, each driven by a Pelton water wheel with water under a head of 1,630 ft. The water is conveyed through two pipes of 8 in. and 10 in. in diameter respectively. The station is situated in the shaft of the mine, and the exhaust water is carried off by a tunnel to the Caron River. The current is led to the mill, where it drives six Brush motors of 125-horse power each.

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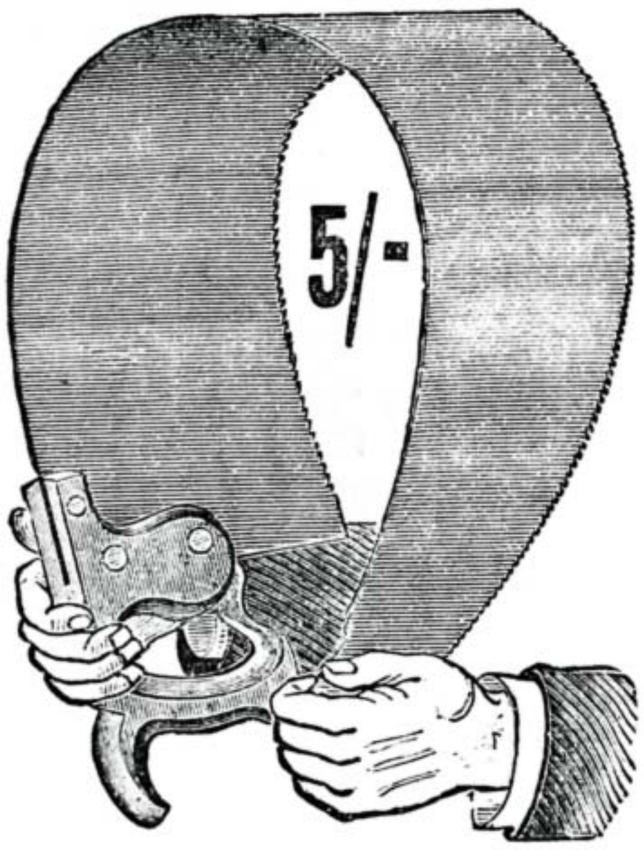

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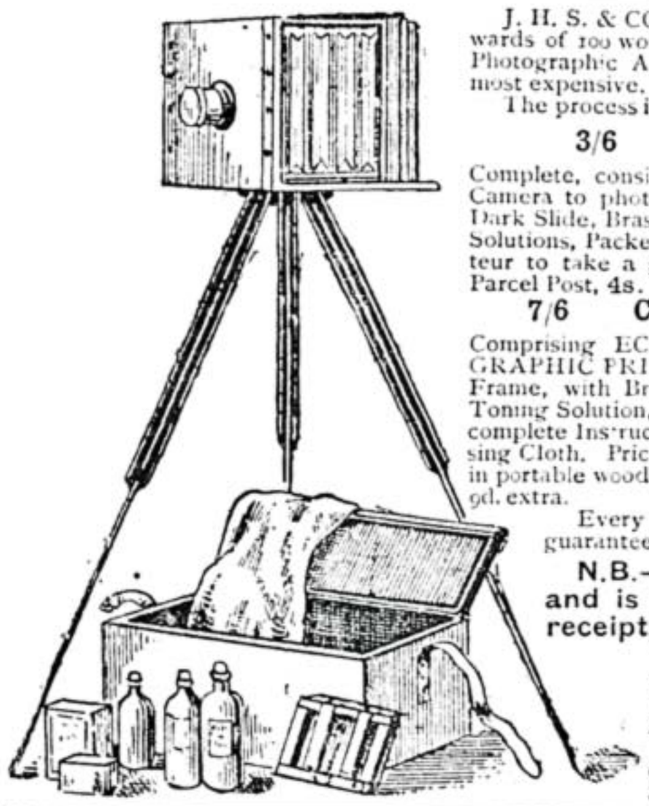

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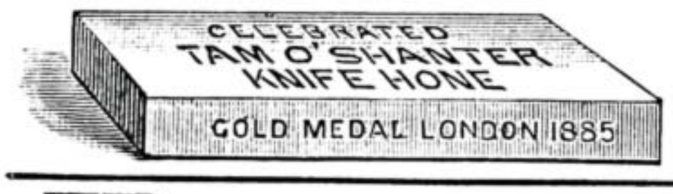

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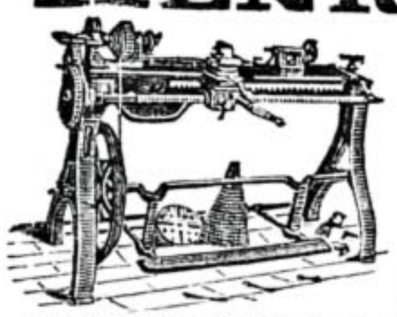

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